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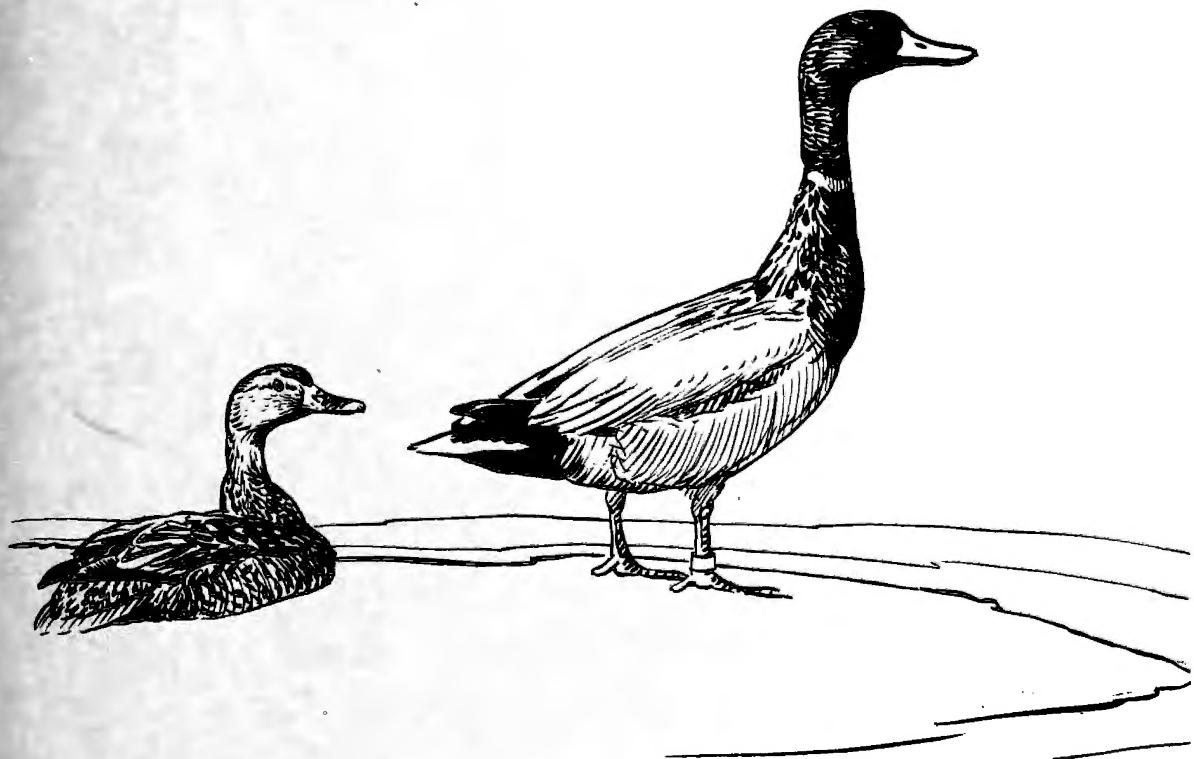
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# WATERFOWL STATUS REPORT 1962



UNITED STATES DEPARTMENT OF THE INTERIOR  
FISH AND WILDLIFE SERVICE  
BUREAU OF SPORT FISHERIES AND WILDLIFE  
Special Scientific Report--Wildlife No. 68



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## WATERFOWL STATUS REPORT, 1962

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FISH AND WILDLIFE SERVICE

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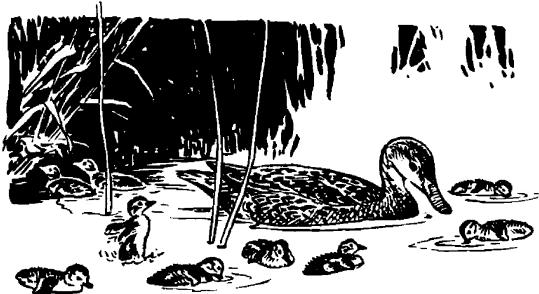


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# WATERFOWL STATUS REPORT 1962

Each year in early August, waterfowl shooting regulations are established for the current hunting season. Information on the status of waterfowl must be available to responsible wildlife officials during the conferences leading to formulation of the regulations. This report has been compiled to provide such information.

Data concerning the current status of waterfowl are gathered by means of four major surveys:

1. Survey conducted among waterfowl hunters immediately following the season to measure the size and species composition of the kill and the effect of hunting regulations on hunter activity and success.
2. Duck wing collection survey conducted during the hunting season to obtain information on age ratios in the hunting kill.
3. Survey of wintering areas on the North American Continent in early January to measure the distribution and relative number of birds remaining after the shooting season.
4. Survey of major continental breeding

areas during May, June, and July to measure size and distribution of the breeding population and the relative number of young produced.

A fifth major endeavor in recent years has been banding, particularly of young birds on the breeding areas. The purpose of this banding is to establish relations between breeding ground and harvest area so that data from breeding ground surveys can be properly associated with the four Flyways for management purposes.

Results of the winter and breeding ground surveys are summarized as forecasts of anticipated changes in the relative size of the 1962 fall flight of ducks, geese, brant, and coots in each of the four Flyways in the United States.

Inasmuch as waterfowl management in the United States is based on the Flyway concept, this report is organized accordingly. For purposes of this report, the four Flyways have been extended beyond the international boundaries of the United States to include breeding and wintering grounds of waterfowl most closely associated with the Flyways.

## SCOPE OF INVESTIGATIONS AND METHODS USED

### WATERFOWL KILL SURVEY

Data supplied by Robert G. Heath,  
Bureau of Sport Fisheries and Wildlife

Each year, immediately following the hunting season the Bureau of Sport Fisheries and Wildlife conducts its mail-questionnaire survey of waterfowl hunters in the United States. The objectives of the survey

are: (1) To estimate at both the Flyway and State levels the magnitude of the harvest of waterfowl and the total number of active hunters and hunter-days afield; (2) to measure the relative changes in these estimates

from year to year; and (3) to assess the effects of changes in season length and size of daily bag limit on total bag and on hunter performance. The 1961-62 hunting season marks the tenth consecutive year of operation of the survey since its inception in 1952.

By necessity the survey utilizes as its sampling universe those post offices throughout the Nation which sell Migratory Bird Hunting Stamps, since there is no complete listing of waterfowl hunters to facilitate the survey. Each year approximately 2,000 post offices are designated to cooperate in the survey as "sample outlets." These outlets are selected randomly, within States, from two strata of post offices: those outlets having outlying branches and stations under their jurisdiction (usually in larger towns and cities), and those without branches or stations (usually in smaller towns and rural localities).

Names and addresses of hunters are obtained by means of business-reply "contact cards" distributed to all persons buying "Duck Stamps" at sample outlets. The card requests the individual's name and address, the number of stamps he purchases, the reason for his purchase, and the names of persons in his household younger than the stamp requirement age of 16 years who might hunt waterfowl during the season.

All contact-card respondents who purchase stamps for the purpose of hunting, as well as their listed child hunters, are mailed a hunter questionnaire at the close of the waterfowl season. The questionnaire asks each hunter the total number of days on which he hunted, his total bags of ducks and geese by species, and of coots; the numbers of ducks, geese, and coots he knocked down but failed to retrieve; and his hunts and bags of waterfowl (without distinctions as to kind) by dates of the season. These data combined with the reports of each State's total sale of "Duck Stamps" are used to derive the various survey estimates.

All estimates are subject to several sources of error (as is true for most types of surveys). In addition to sampling error due to random sampling variation, the estimates may be affected by misreporting (respondents tend for example, to exaggerate their bag). The estimates are further subject to nonresponse bias in that hunters who fail to respond may have differed from respondents in their hunting performances.

Also, rarely, bookkeeping errors may affect the reported sale of "Duck Stamps" in a given State, so that for 1 year the estimates of that State's total waterfowl kill and total hunter activity (as derived by expanding "average hunter performances" by stamp sales) will stand in error until post office auditing discloses the discrepancy in its sales report.

The 1961-62 estimates presented herein are necessarily tentative and may be changed slightly in future reports. This condition stems largely from the fact that the Bureau's newly designed electronic computor program, which will compute all estimates rapidly with increased precision, was not fully tested in time for this year's deadline; many of the estimates were computed basically as in past years, except that the statistical design utilized the stratification of post offices within States as described above.

Certain estimates were computed differently this year, and in some instances the original estimates derived from the 1960-61 survey data (as presented in the 1961 Waterfowl Status Report) were changed to conform with the 1961-62 statistics. To begin with, the current Flyway estimates of the duck, goose, and coot bags have been temporarily adjusted for response bias by reducing the reported bags by the same proportion as the respective 1960-61 report. This method, of bias adjustment was used because the existing procedure (Atwood, 1956)<sup>1</sup> was not designed to deal with a 2-duck daily bag limit as was prevalent this season in many States, and because new studies of the nature of response biases seem to suggest ways of refining the existing procedure. Final adjustment of the data for response bias will be postponed until completion of these studies.

A second revision initiated this year is that of basing the species composition of the duck kill on the findings of the Bureau's duck wing survey instead of the reports of questionnaire respondents. The duck wing survey is believed to be more accurate even though both estimates generally agree quite well.

A further revision is that of no longer adjusting for response bias the reports of waterfowl "knocked down but not retrieved." Current limited data from the Bureau's Spy-Blind Study (in progress), wherein hunters under secret surveillance from

<sup>1</sup>See Literature Cited, page 55.

spy-blinds are interviewed following their hunts, suggest that hunters tend to minimize rather than exaggerate their reported crippling losses. The bias adjustment procedure, in opposition to the above finding, is designed primarily to reduce the magnitude of reported performances. Therefore, the decision was made to curtail bias adjustment of the crippling data, and the 1960-61 estimates reported herein have been revised accordingly.

It should be noted that the Bureau plans as rapidly as possible to revise and standardize the estimates from as many as possible of its earlier kill surveys to increase the comparability of all estimates throughout the years.

The 1961-62 measurements reported here, as derived from the responses of over 36,000 hunters contacted throughout 2,100 sample post offices, are as follows:

1. Total Flyway bags of ducks, by species, adjusted (as described above) for response bias, and total

ducks knocked down but not retrieved.

2. State and Flyway estimates of total duck bags, unadjusted for response bias, and reported averages of numbers of ducks bagged per hunter.
3. Total Flyway bags of geese and of coots, adjusted for response bias, and total geese and coots knocked down but not retrieved.
4. Hunter averages, by Flyways, of seasonal bag and crippling loss and of daily bag, computed separately for ducks, geese, and coots. (Estimates pertaining to bag adjusted for response bias.).
5. State and Flyway estimates of the total number of active hunters, total hunter-days afield and average number of days afield, and average number of days afield per hunter.

Section A of the appendix (p. 57), contains tabular data summarizing annual waterfowl kill statistics.

## WING COLLECTION SURVEY

Data supplied by Samuel M. Carney and Alfred J. Godin,  
Bureau of Sport Fisheries & Wildlife

The duck wing collection survey has evolved from a small-scale pilot study in Minnesota in 1958 to include Flyway-wide surveys in the Mississippi Flyway in 1959-60, the Mississippi Flyway and the Atlantic Flyway in 1960-61, and all Flyways in 1961-62. (table B-1. p. 70).

The objectives of the survey are:

1. To obtain an estimate of the age and sex ratios in the kill for the mallard, the black duck, and most of the other game ducks.
2. To obtain an estimate of the duck species composition in the kill.
3. To obtain information on changes in the species, sex, and age composition of the kill during the season.
4. To determine the chronological distribution of the duck kill by periods within the season, days of the week, and hours of the day.
5. To investigate other types of information that can be obtained from duck wing surveys.

The hunters whose kills have been sampled by this survey have been selected largely from respondents to the Bureau's mail-questionnaire survey of the previous year who were over 15 years old and who had reported bagging at least one duck. Additional hunter-contacts came from lists of respondents to the previous year's wing surveys and in a few instances, from lists of hunters who had reported bagging a banded bird. An attempt was made to draw samples of waterfowl hunters that were distributed geographically within a State in the same proportions as the distribution of duck stamp sales. Details of the procedures followed and the technique involved have been summarized elsewhere (Geis and Carney, 1961, and Carney and Geis, 1960.).

Immediately before the opening of the hunting season, the hunters to be sampled were sent supplies of business reply envelopes and were asked to return one wing from each duck they killed during the season. A postcard addressed to the Bureau

was included for those hunters who might need additional envelopes.

All wings received were kept frozen until they could be examined. Teams of State and Bureau biologists assembled at freezer-storage points and identified the

species, age, and sex of the bird each wing represented. The accuracy of this work was carefully verified.

Section B (pp. 70-74) of the appendix contains tabular data summarizing the annual results of the wing collection survey.

## WINTER SURVEY

Data supplied by Fred A. Glover,  
Bureau of Sport Fisheries and Wildlife

The annual winter survey to obtain information on waterfowl wintering conditions and distribution covered all major wintering areas of the United States, Canada, and Mexico. In the State of Alaska and in Mexico the Bureau of Sport Fisheries and Wildlife organized and conducted the survey. In the rest of the continental United States, the Bureau organized the survey, but much of the field work was done by personnel of the various State conservation departments. The U. S. Department of Defense and the U. S. Coast Guard supplied the aircraft used in aerial counts in many areas. In Canada, the survey was organized by the Canadian Wildlife Service, and the field work was done by the Service and the Provinces.

The wintering areas were surveyed by means of boats, cars, and aircraft, with most of the important areas being censused from the air. Aerial photographs were taken to supplement visual estimates in some of the more important concentration areas, particularly in California.

It must be emphasized that the number of birds observed and recorded during the winter survey does not constitute an estimate of the total population in any Flyway or for the continent as a whole: the survey does not include all wintering areas of North American waterfowl, and inherent variables exist in the estimating technique. However, for most of the wintering areas it is believed that yearly data for most of the major species can be used to establish broad trends in population size. In addition, the winter survey data have great value for determining the use made of various wintering areas and the change in distribution from year to year in response to changing weather and habitat conditions.

All data referring to the 1962 winter survey are based upon observed birds.

Section C (pp. 75-83) of the appendix contains tables summarizing the results of the annual winter survey.

## BREEDING GROUND SURVEY

Surveys are conducted each year on the waterfowl breeding grounds for the purpose of estimating the relative size of the fall flight from each of the breeding areas. Two coverages of the breeding areas are required to obtain the necessary information: the first, during May and June, to measure distribution and relative size of the breeding population; the second, during July, to forecast the relative number of young that would be produced. In July it is necessary to make a preliminary estimate or forecast of the number of young that will be produced, since only a part of the season's young will have hatched at the time field

work must be terminated so that data will be available for setting the shooting regulations. The production survey, therefore, consists of a measure of the number of broods on the water at the time of the survey plus a measure of weather, water, and other conditions that affect or reflect production success following the survey period.

Most of the important waterfowl breeding areas in Alaska, Canada, North Dakota, South Dakota, and Minnesota are surveyed from the air. Statistically designed sampling techniques and similar methods of collecting and analyzing data are used

throughout these areas. In addition to the areas mentioned, approximately 22 of the Northern States conduct breeding-ground surveys. Methods vary somewhat among these States, although in States with important numbers of breeding ducks the methods are similar in most respects to those employed in the Dakotas, Canada, and Alaska.

In recent years, aerial crews have sampled approximately 2,375,000 square miles of the best duck breeding habitat on the North American Continent. The only important duck breeding areas that are not being censused currently are those in eastern Ontario, Quebec, and Labrador, for which adequate census techniques have not yet been developed.

The aerial crews count the birds on somewhat less than 1 percent of the total breeding area. This is sufficient coverage to reduce sampling error to less than 20 percent of the average population density in most survey areas, and to much less than 20 percent when considering the breeding range as a whole.

The results of the breeding-ground surveys are presented as indexes. When conducting aerial surveys of breeding birds or of broods, not all birds present are seen by the aerial crews. Methods of measuring the proportion of birds present that are seen are being developed, but these studies have not progressed to the point where visibility factors can be determined throughout the breeding range. Since there

is no attempt to estimate the number of birds not seen, the indexes presented in this report are based on birds actually seen, and it is emphasized that they do not constitute estimates of the total numbers present.

Results of the May survey of the breeding population and of the later production survey, when combined, form the basis for forecasts of changes in the relative size of the fall flight of ducks and coots in the three Flyways from the Mississippi Flyway westward. It is not possible to rely on the breeding-ground information to the same degree in the Atlantic Flyway as in the other Flyways, primarily because of the lack of survey data from Quebec and Labrador, which are important contributors of birds to that Flyway. Experimental aerial surveys were conducted in these Provinces in 1962 by the Bureau of Sport Fisheries and Wildlife. It is expected that this experimental work will be the foundation for operational surveys in Quebec and Labrador in the future.

The breeding-ground surveys are cooperative. The Bureau of Sport Fisheries and Wildlife, the Canadian Wildlife Service and the Provincial game branches, Ducks Unlimited, and the State conservation departments combine their equipment and manpower to conduct the necessary surveys throughout the vast extent of the waterfowl breeding range.

Sections D, E, and F of the appendix contain tables which summarize the annual breeding-ground surveys.

## BANDING

Data supplied by Aelred D. Geis,  
Bureau of Sport Fisheries and Wildlife

Banding is a powerful tool in waterfowl research. It provides information on the relation between production and wintering and harvest areas which makes possible the prediction of the influence that the population changes, determined from the breeding-ground and wintering-ground surveys, will have on waterfowl using various harvest areas. Band-recovery data also provide valuable information on survival rates, effects of regulations on the kill, importance of hunting as a mortality factor,

and the relative shooting pressures to which various ages, sexes, and species are subjected.

Few banding data are available for inclusion in this status report owing to complications resulting from loss of records in a fire at the Patuxent Wildlife Research Center on June 13, 1959. However, recovery rates from 1961 bandings of some important species of ducks are present to compare with recovery rates of previous bandings.

## BREEDING GROUND BANDING

The primary objective of the breeding ground banding program is to determine distribution of the hunting kill of birds produced in each major breeding area. To accomplish this objective, it is necessary to confine banding to birds known to have been produced near or to breed near the locality of banding. Therefore, the banding program has emphasized the banding of "locals," immature birds that are too young to fly.

The following table illustrates the information obtained from this program. It shows the distribution of direct (first hunting season) recoveries from mallards banded as flightless immatures (locals) in the three highly important Prairie Provinces of Canada. This table also shows why the results of banding frequently cannot be logically segregated by Flyways, since it is usual for recoveries from a given

breeding area to be taken in two or more flyways.

Distribution among Canada and the four Flyways in the United States of direct band recoveries from mallards banded as flightless young, 1953-60

[A few birds banded before 1953 may be included in the data]

| Harvest area            | Distribution (percent) of recoveries from bandings in-- |              |          |
|-------------------------|---|--------------|----------|
|                         | Alberta   | Saskatchewan | Manitoba |
| Canada-----             | 55.8  | 39.9         | 52.9     |
| Pacific Flyway-----     | 21.7  | 4.0          | 0.0      |
| Central Flyway-----     | 11.5  | 23.3         | 11.2     |
| Mississippi Flyway----- | 10.8  | 32.2         | 34.8     |
| Atlantic Flyway-----    | 0.1   | 0.7          | 1.1      |
| All areas-----          | 99.9  | 100.1        | 100.0    |
| Total recoveries----    | 658   | 2,239        | 187      |

## PRESEASON BANDING

Band recovery rates from ducks banded during the summer and early fall before the hunting season indicate changes in the comparative rate of the kill each year. This information supplements the information on total kill as measured by the mail-questionnaire survey of waterfowl hunters. It does this by indicating, for example, that a decrease in the kill was, perhaps, due to a decrease in the proportion of the population harvested, or, possibly, that it was due to a decrease in the preseason population which was harvested at the same rate as in the prior year. Other objectives of the preseason banding program are discussed in the 1961 Waterfowl Status Report.

Table G-1 (p. 124) summarizes mallard band recovery rates for preseason bandings

during 1959, 1960, and 1961. It indicates that mallards banded at locations from eastern Montana to Michigan had a substantially lower rate of kill in 1961 than in 1960. A rough estimate of the extent of this decline in rate of kill is indicated by comparing the unweighted average recovery rates from bandings for the two years. The average immature rates in the Central and Mississippi Flyways dropped about 35 percent, while the adult rate dropped 12 percent. Mallard recovery rates in the Pacific Flyway remained about the same or declined slightly.

Table G-2 (p. 125) summarizes the results of preseason bandings of black ducks. No clear pattern of decline or increase of rate of kill is revealed by the limited data available.

## WOOD DUCK BANDING

The cooperative wood duck banding program was started in 1959 by the Mississippi Flyway Council because of the lack of information about this important duck. To complete the picture, the Atlantic Flyway States renewed their efforts in the banding of wood ducks. Of primary concern in the wood duck banding program is an appraisal of the importance of hunting

as a mortality factor and the effects that hunting regulations have on size of kill. Another major objective of the wood duck banding program is to determine the feasibility of making indirect population estimates based on banding data, in conjunction with information from wing collection and waterfowl kill surveys.

Wood duck bandings in most Mississippi Flyway States showed a pronounced drop in recovery rates in 1961 compared with the earlier years (table G-3, p. 127). Also, extremely low recovery rates were obtained from bandings in southern States. These data suggest that the wood ducks in the Mississippi Flyway benefited greatly from the generally more restrictive regulations in effect during the 1961 hunting season. They also suggest that summer and pre-season populations in the more southern

States are subjected to a lower shooting pressure than populations associated with northern States. It is noteworthy that the recovery rates for Vermont and New York banding (where 1958 data are also included in the Atlantic Flyway showed no change in 1959 associated with the relaxation of the daily bag limit from one to two.

Section G (pp. 125-127) of the appendix contains tables summarizing band recovery rates.

## PACIFIC FLYWAY

### WATERFOWL KILL SURVEY

An estimated 1,776,000 ducks were bagged in the Pacific Flyway during the 1961-62 waterfowl season, approximately 21 percent fewer than during the 1960-61 season (table A-1, p. 57). An additional 408,000 ducks were knocked down but not retrieved, yielding a total (bagged plus unretrieved) of approximately 2,184,000 ducks, 23 percent fewer than during the previous season.

Analysis of the total duck bag by species as derived from data provided by the duck wing survey (table A-1, p. 57) reveals that five species, mallard (608,600), pintail (327,000), American widgeon (305,400), green-winged teal (219,700), and shoveler (131,800), accounted for 1,592,500 birds or approximately 90 percent of the total bag of 1,776,000 ducks. During the previous season the same five species, as computed from hunter reports in the mail-questionnaire survey, comprised 87 percent of the total bag.

Because the 1961-62 season was the first during which the duck wing survey was conducted in the Pacific Flyway, the subsequent estimates of bag by species which are based on the findings of that survey are not strictly comparable with those of the previous season, which were derived from the hunter questionnaire. Consequently percentage changes in the bags of species have not been computed even though in

general they might be reasonably accurate. In this regard the bag apparently dropped in all five of the major species mentioned above. (It was hoped that the 1961-62 species estimates based on questionnaire responses could also be presented in this report; however, current work demands have as yet made this analysis impossible).

Although the 1960-61 estimates of duck bag by States may be subject to appreciable variation due to small sample size, it is interesting to note that only Idaho registered an appreciable increase, 17 percent, in total bag of ducks (table A-2, p. 58). Washington showed virtually no change (+2 percent), Oregon dropped 18 percent, and Utah, California, Nevada, and Arizona dropped more than 30 percent.

The total estimated goose bag of 181,000 birds dropped 30 percent from the previous year. An additional 88,000 geese were knocked down but not retrieved for a total kill of approximately 348,000 geese.

An estimated 58,400 coots were bagged, a 2-percent decrease. An additional 50,700 coots were knocked down but not retrieved for a total kill of about 109,000 coots.

A total of 218,100 waterfowl hunters were active during approximately 1,368,000 hunter-days, decreases of 11 and 14 percent, respectively, from the previous season (table A-3, p. 59).

## WING COLLECTION SURVEY

Flyway-wide age ratios of the more important species of ducks in the Pacific Flyway kill are shown in table B-2 (p. 70). Mallard age ratios for individual States of the Flyway in 1961-62 are shown in table B-3 (p. 71). Differences in mallard age ratios from supplemental collections made in 1959-60, 1960-61, and 1961-62 are shown in table B-4, (p. 72).

Pintail age ratios from supplemental collections during these three hunting sea-

sons (table B-4) indicate sharp declines in the number of immatures per adult in 1961-62 from the California collection points where comparison with the previous year was possible. These lower ratios suggest that pintail populations in the Pacific Flyway were adversely affected by the drought in the Prairie Provinces of Canada.

Species composition in the Pacific Flyway is shown in table B-5 (p. 73).

## WINTER SURVEY

Data supplied by John E. Chattin, Flyway Representative,  
Bureau of Sport Fisheries and Wildlife

### FACTORS AFFECTING SURVEY

The winter surveys conducted in this western Flyway were affected by weather conditions slightly below average. The weather was closely comparable to the survey weather of 1961 when aerial work was delayed several days owing to fog or marginal flying weather in some areas. Poor weather this year in parts of Alaska, Nevada, California, and lower California delayed aerial surveys for several days, but the 1962 results are considered closely comparable with prior years in these survey units.

The waterfowl wintering in western Montana designated as part of the Pacific Flyway were counted but not included in the summary tabulations of this report. Only 17,000 waterfowl were recorded in the Pacific Flyway section of Montana; therefore, this number would not influence the comparability of Flyway totals to any important degree.

The Alaska and British Columbia surveys do not include total coverage of all waterfowl habitat within their boundaries but include only sample areas. These have been selected on the basis of the degree of certainty with which they can be covered from the air each year; survey results for these two units are considered comparable from year to year. Coverage of all other units is complete and comparable.

### POPULATION TRENDS

The grand total of waterfowl wintering in the Pacific Flyway in January 1962 remained approximately the same as the 10-year average and declined slightly (-7 percent) from the previous year.

The principal dabbling ducks, mallards, baldpates, and pintails, declined slightly from 1961. Of these three species the bald-pate declined more (-13 percent) than the other two but remained 5 percent above the 10-year average. The mallard population remained above the 10-year average (+10 percent) but slightly below last year. The pintail now stands 7 percent below the 10-year average and 8 percent below 1961.

Rather large increases were registered by the three principal species of divers found in the Pacific Flyway. Scaups increased 43 percent over 1961 but remained slightly below the 10-year average. Ruddy ducks and scoters increased 33 percent and 27 percent, respectively, over the previous year. Scoters now stand 59 percent above their 10-year average numerical status.

Geese as a group increased 11 percent over 1961 and now are 26 percent above their 10-year average status. The large Canada goose declined 22 percent from last year, but this decrease was outweighed by increases in snow, white-fronted, lesser Canada, and cackling geese. Special counts

of Ross's geese resulted in the highest figure (27,920) ever recorded for this species.

A significant decline in numbers of coots (39 percent) was recorded in 1962 compared with 1961. The status of the coot wintering population in this Flyway now stands 18 percent below the 10-year average. Black brant remained approximately

at the same status as 1961 but 34 percent above the 10-year average.

Whistling swans declined 20 percent from 1961 and 10 percent from their 10-year average status.

Reference should be made to tables in appendix C for further information relating to the winter survey data.

## BREEDING GROUND SURVEY

### ALASKA

Data supplied by Henry A. Hansen,  
Bureau of Sport Fisheries and  
Wildlife, and Peter E. K. Shepherd,  
Alaska Department of Fish and  
Game

### WEATHER AND HABITAT CONDITIONS

Throughout its entire area Alaska experienced a severe winter in every respect. Extremely low temperatures early in the winter created ice up to 60 inches thick followed by a heavier than normal snowfall. The result was a very late breakup and generally retarded spring weather. As late as June 6 much of the Bering Sea coast was still icebound with freezing temperatures at night. There was ample open water on small ponds and streams for the birds to be well dispersed, but the larger lakes were still frozen solid and the major rivers were still running ice near the sea coast. On June 7 we encountered snow showers throughout the Koyukuk Valley, and on June 10 almost half an inch of snow was deposited in the Liard River Valley north of Watson Lake, Yukon Territory.

The breakup not only was later than normal but was more severe on the large rivers, causing floods on much of the adjacent waterfowl habitat. Many of the more productive areas were standing under several feet of water which eliminated all nesting cover. Even more critical were those areas which flooded after the early nesting species (pintails and mallards) had started to incubate. Calvin C. Lensink, Bureau of Sport Fisheries and Wildlife, reported from his ground study area in the upper Yukon Basin on June 15 as follows:

About 10 days after breakup (during the first 10 days in June) melting snows in the mountains sent the Yukon and Porcupine Rivers and all their tributaries on the rampage and resulted in flooding of a large portion of the Yukon Flats. This included most of our study areas and we actually canoeed over trails or through the woods to get from one lake to another. Many early nests were undoubtedly destroyed although the action of the birds suggested that there was a lot of re-nesting or re-nesting attempts.

The Minto Lakes area west of Fairbanks flooded early, before much nesting was started. Peter E. K. Shepherd, Alaska Department of Fish and Game, reported that pintails and other early nesters either moved to the fringe of the flooded area where nesting conditions were suitable, or nested with the scaup on floating mats of buckbean (*Menyanthes trifoliata*). On June 7 much of the Koyukuk Valley was flooded well back into the willow and spruce bordering all the smaller tributary streams, and the water appeared to be still rising. By the first of June deserted male pintails were already forming small flocks even along the frozen Bering Sea coast. Thus, any flooding after the end of May would be quite detrimental to pintails which comprise one-fourth or more of Alaska's duck population.

### BREEDING POPULATION INDEXES

The 1962 aerial waterfowl breeding population survey was conducted in Alaska and adjacent Canada between May 18 and June 11. All areas except the low-density stratum I were covered with 220 16-mile transects, censusing 880 square miles of habitat. All the data summarized in the accompanying tables are directly comparable between 1961 and 1962.

If there was any change in the total waterfowl breeding population in Alaska

it was too small to be detected with the intensity of the current aerial survey. There may have been a slight increase in game ducks with a corresponding decrease in scoters, oldsquaw, and eiders. Of the more important species, mallards showed the greatest change with a decrease of more than 40 percent. Buffleheads and goldeneyes increased approximately 25 percent, while scaup, widgeon, and pintails were comparable with 1961.

The survey in the southern part of Yukon Territory and northwestern British Columbia was enlarged to 35 transects and flown from June 9 to June 11, after the Alaska survey was completed. In general, the distribution of birds was better than during the early survey in 1961, and flying conditions were incomparably better with the ice gone and refueling facilities available. This survey can never be as accurate as desirable (nor as accurate as aerial surveys elsewhere) because the extremely rough terrain precludes flying at a low enough altitude to properly scan the lakes. Be that as it may, about 20 percent more ducks were inventoried on the 22,500 square miles of habitat than were counted last year, for a mean density of 13.3 per square mile. However, this probably reflects a more accurate sample rather than an increase in breeding population.

Consult tables 1, 2, and 3 in Section E of the Appendix, pages 92-93 for a summary of Alaskan data.

## PRODUCTION INDEXES

The severe winter followed by a late breakup and subsequent flooding wreaked havoc with production in many of the major areas. The late spring in itself seems to have lowered production generally, but the floods following the onset of incubation practically wiped out production of the early nesting species in some areas. The Bureau of Sport Fisheries and Wildlife conducted production studies at Tetlin and the Fort Yukon Flats, and the Alaska Department of Fish and Game conducted a duck study at Minto and the brant study on the Yukon-Kuskokwim Delta.

At Minto, Peter E. K. Shepherd reported that, at best, production will be no better than 20 percent of last year's (1961), and probably 10 percent will prove more accurate unless scaup broods eventually appear

in greater numbers than seem likely at this time. The early nesting mallards, pintails, teal, and shoveler were almost a complete failure, while diving ducks may be fair. Canvasbacks, although relatively few, seem to have done quite well. Surprisingly, the average brood size held up fairly well at Minto. Shepherd counted 100 broods with an average of 6.5 per brood, all age classes combined. Flooding was the great decimator.

At Tetlin the situation was somewhat better and may be indicative of those interior areas which were not subjected to flooding. Average brood size decreased from 6.8 in 1961 to 4.9 in 1962, but total production may be as much as half of last year's (1961) if scaup have much success. In past years from 10 to 20 percent of all the broods counted by mid-July have been scaup. This year only two scaup broods were observed by July 19 at Tetlin. Scaup are normally late nesters, but this year they have been retarded even more than the early nesting species. At Tetlin, canvasback did exceptionally well even as they did at Minto. Green-winged teal were the most abundant broods counted at Tetlin. More teal were counted than in previous years. The other species, however, decreased from 1961. The water at Tetlin was high from the heavy snow pack of last winter, but there was no flooding after the onset of nesting because few of the lakes are directly connected to rivers and streams as they are in many of the other valley habitats.

On the upper Yukon River Basin, Calvin C. Lensink reported that production decreased about 50 percent from 1961, but that the average brood size, as at Minto and in contrast to Tetlin, is but slightly smaller (6.3 in 1961 vs. 6.1 this year) (Table F-1, p. 110). In general, the dabbling duck production showed major decrease. Pintails and mallards will produce very few ducks. Shoveler, widgeon, and teal production is a little better. As elsewhere, canvasback production is fairly good, but scaup are so late that their success cannot be forecast yet. Undoubtedly, scaup success will be far below average, because of the retarded spring. Flooding of the Valley after early nesting species had started to incubate was the most serious decimating factor.

In spite of the late season, goose and brant production looks good in contrast to the poor duck success everywhere. The

number of brant nests counted on the sample plots was slightly higher than the one nest per acre counted in 1961, and the hatch was correspondingly good. No comparative studies were made of goose production elsewhere, but during the early phase of the banding operation on the Copper River Delta it appeared that young western Canada geese (*B.c. occidentalis*) were as abundant as in some of the former good production years.

In summary, Alaska's duck production overall will be no better than 50 percent as good as last year with the early nesting dabbling ducks less than that and the late nesting species perhaps slightly better.

## SPECIAL STUDIES

### GENERAL

Upon their return to the Yukon-Kuskokwim Delta, black brants and other coastal nesting geese faced one of the latest springs in the past 10 years. The tardy spring delayed nesting at least 1 week or more, allowing few brant to nest before May 25, with the majority of nests hatching by June 29 (June 22, 1961). By rule of thumb these conditions, if accompanied by inclement weather, would bespeak gloomy prospects for a good nesting season. However, any undesirable effects of the late breakup were probably nullified by extremely fine weather most of June, which was accompanied by an accelerated growth of food and cover plants. Nesting and brood conditions were judged very good to excellent and far better than 1961.

### PRODUCTION STUDIES

A thorough search of the 231-acre Kashunuk River study area revealed an increase in waterfowl nesting densities--especially black brant (table F-2, p. 110). This increase was not confined to this particular area, but was evident in a subsequent check of 85 1-acre nesting plots, which are placed at random over the main brant nesting habitat. Statistical treatment of the study area and nesting plot data showed a significant chi-square value for the study area and the total number of nests but not for the plots; however, the percentage increase for the 1-acre nesting plots closely

approximates that of the study area. The nonsignificant chi-square value may be a result of too few plots. Regardless, these figures suggest that the breeding segment of the black brant population has increased since 1961.

The average clutch size in 1962 was 3.6 eggs (329 clutches) or the same as in 1961 (table F-3, p. 111). Hatching success was 84 percent in a sample of 100 nests. The average brood at hatching was 3.5 downies. Brood mortality the first 10 days after the peak of hatching appeared lower than in 1961, again enhancing chances for a good production season. Finally, an experimental aerial survey (flown phenologically at the same time in 1961) indicated 59.2 broods per square mile as compared to 52.5 in 1961. Though not statistically significant, these figures at least follow the trend established by the nesting plots and study area.

### PROSPECTS

An increase in the fall black brant population is expected.

### SUMMARY

Excellent nesting and brood conditions nullified the possible adverse effects of an extremely late spring. Breeding ground nesting plots and the nesting study area data indicate an increase in black brant breeding population. Hatching success of 84 percent and lowered brood mortality suggest extremely successful production in 1962. Prospects for a black brant population increase are good to excellent.

### CONCLUSIONS

Although the Alaskan waterfowl breeding population remained the same in 1962, the late spring breakup and flooding of nesting habitat were responsible for an estimated reduction in duck production of 50 percent from 1961.

The status of the black brant improved over last season owing apparently to very favorable brooding conditions which offset the effects of a late spring. Increases in the fall flight of black brant from Alaska are expected.

## NORTHERN ALBERTA, NORTHEASTERN BRITISH COLUMBIA, NORTHWEST TERRITORIES, AND YUKON

Data supplied by Robert H. Smith,  
Bureau of Sport Fisheries and  
Wildlife

### WEATHER AND HABITAT CONDITIONS

During the survey period the weather was poor, at least for flying--low clouds, fog, and rain. In spite of the rain and poor visibility, temperatures were mild; consequently, no adverse effects on waterfowl nesting could be expected. A late season was forecast but did not materialize, and breakup of small ponds and lakes came almost on schedule. Surface water on the southern transects still remained sparse except for permanent lakes and ponds, but frequent rains produced some sheet water in fields without affecting water levels in the dry ponds and potholes. Undoubtedly, subsurface water tables will have to be built up before tangible results can be seen in the potholes. Elsewhere water levels were extremely variable. The Mackenzie Delta was flooded again for the second consecutive year and lake levels throughout much of the lower Mackenzie Basin were high. South of Great Slave Lake, water levels were lower than normal although adequate for waterfowl production.

The weather was not favorable for duck production in the lower Mackenzie Basin. There was much rain with extended periods of precipitation during the period of hatching and the critical early stages of brooding. Both major delta systems, the Athabasca and the Mackenzie, were flooded during most of the summer; thus the problem in the far north was too much water. To the southeast, particularly in the region surrounding Great Slave Lake, water levels were quite low yet adequate for duck production. Still farther south, from Fort McMurray to the edge of the "bush," abundant rainfall was the rule, particularly during the critical hatching and early brooding period. The long-range effects of this heavy precipitation in the southern portion of the area will be beneficial, but the immediate effects were probably harmful to waterfowl production.

### BREEDING POPULATION INDEXES

Decreases in overall waterfowl populations were recorded for all strata except in stratum 9, "Upland Tundra." In general, decreases were most pronounced in the south, northern Alberta, northeastern British Columbia, and the southern section of the Northwest Territories, strata 1.1, 1.2, 2, 5, and 3, which are stratified from south to north in that order. As the prairies and parklands are still dry, this would seem to indicate that the displaced prairie ducks that moved into the southern forest region during the past few years have largely passed out of the picture. A review of table E-4 (p. 94), will show decreases in all species of waterfowl with the exception of buffleheads, redheads, and gadwalls. The range of the latter two species is so limited in our survey area that these figures are probably not significant. It is interesting to note, however, that a male redhead was observed in the Old Crow Flats, the first of this species ever recorded by us north of the Arctic Circle.

The general decrease in waterfowl throughout the survey area brings our population down to the 1956 level (table E-5, p. 95). The 1956 report stated, "This is the first time in several years that we have recorded an increase in the waterfowl breeding population in the north, and while the increase in ducks in general may not be significant . . . it nevertheless indicates a leveling out of the downward trend due probably to the deflection of the northern breeding population to the prairies." Thus, our northern breeding population has once again declined. This time, unfortunately the ducks are not being siphoned by the excellent water conditions on the prairies. The obvious conclusion is that the continental duck population is extremely low. We believe the downward trend in the north will continue until we are down to our normal bedrock population and that the situation will get worse before it gets better.

### PRODUCTION INDEXES

It will be seen from table F-4 (p. 111), that the overall decrease in number of broods recorded was 29 percent less than in 1961, which also was a poor year for duck production. Samples of all strata surveyed showed considerable decreases,

except that in stratum 3 the data are so meager that their significance is questionable.

Brood sizes in class I and II remained practically unchanged. Class III broods increased by one. It seems illogical, however, to believe that these could average larger than class II broods and the increase probably reflects the size of the sample.

The actual causes of the decline must be assumed in the absence of any conclusive ground work; yet, we should expect a decrease in the light of our breeding-population survey which decreased 38 percent from 1961. Other assumed unfavorable factors were weather during the period of hatching and early brooding, and flooding in the major deltas.

At the conclusion of our survey a few class I broods were still in evidence. Owing to the preponderance of class II broods, we believe the hatch to be completed for all practical purposes. Certainly, any broods showing after that date would be hard pressed to be on the wing before freezeup.

In conclusion, the outlook is extremely poor for duck production in the far north. A decrease of 38 percent in the spring breeding population, together with a 29-percent decrease in number of broods seen, and adverse weather conditions during the critical hatching and early brooding periods combine to make a dismal picture. These findings agree in general with the experiences of the duck banders and the ground-research crew working in the Yellowknife area.

## CONCLUSIONS

Because the breeding pair index decreased 36 percent from 1961 and the production surveys indicated extremely poor duck production, a much reduced fall flight is anticipated from northern Alberta, Northwest Territories, and northeastern British Columbia.

## SOUTHERN ALBERTA

Data supplied by G. Hortin Jensen and Alva E. Weinrich, Bureau of Sport Fisheries and Wildlife

## WEATHER AND HABITAT CONDITIONS

The summer of 1961 was one of the hottest in our experience. This accentuated the plight of waterfowl and of the potholes, especially in southern and central Alberta. The net result was that by late summer the waterfowl habitat in our survey area had deteriorated to the lowest point since we have been conducting these surveys of annual status.

By midfall of 1961 there was evidence of above normal precipitation in Alberta. These promising conditions prevailed over much of the prairies throughout the winter. Central Alberta--the northern prairies and southern parklands--was not particularly favored in this respect. These favorable conditions were heartening to a degree. They gave hope, but those of us with experience of the extent of the current drought were somewhat passive and reluctant to proclaim any significant improvement for breeding waterfowl. Reports crediting late winter and spring storms dumping heavy layers of snow across the major portion of the breeding grounds are misleading, unless qualified. Soil moisture reserves are so badly depleted at depth, and water tables are so low that it will take above normal moisture for several years to affect these conditions. Only then will we find significant runoff to benefit potholes and duck production.

Snow cover was very quick to disappear from the Alberta parklands and prairies in 1962. During the month of April, the landscape was more or less free from winter snow. April (1962) precipitation was disappointing except for northern parklands. The month, besides being dry, was windy. These conditions were climaxed on May 5 with winds of 40 to 45 miles an hour and

gusting to 60 miles an hour. There was excessive blowing of soil over most of the survey area. Some seeded fields required reseeding. This blowing of soil was the most severe we have witnessed.

Since our surveys began, precipitation has been ephemeral and of little significance on the southern and eastern parklands and all of the prairies. Foothill areas from Calgary south to Pincher Creek have been the chief recipients of this precipitation. During the early spring, significant rains occurred on the western and northern parklands, and this pattern persisted during the survey period.

The prairies are still brown in the east and southeast, and we expect them to remain dormant this season. The exodus of cattle from the ranches of these areas has become a necessity because all available feed, standing and stacked, has been utilized and current growth will not produce fast enough to provide forage.

Climatological records for the current year at Calgary show moisture amounts to be falling steadily behind normal values. It is scarcely possible that sufficient moisture could come this season except to delay temporarily the drying trend of existing potholes. Only after several years of above normal moisture can we expect a reversal from our present drought condition. Any other reasoning would indeed be betting against long odds.

Some runoff in the southern prairie occurred and provided water for potholes. The effects of moisture maintained the northern parklands and increased the number of water areas south and east to the Camrose district. Elsewhere, there is little improvement, and the general trend for the survey areas is one of further deterioration.

Table D-1 (p. 89) summarizes the number of existing potholes for each stratum and the Province. The 1962 values gave a decrease in potholes of 38, 20, 13, and 24 percent for strata A, B, and C and the Province, respectively. Compared to 11-year averages, the decreases were 61, 13, 27, and 33 percent for strata A, B, and C and the Province, respectively. The greatest losses are in strata A and B, which are the significant waterfowl production areas. With the extreme northern area and some southern areas tending to hold the line, one can imagine the conditions in central Alberta where there has been a relentless drying

trend. At the present time, conditions are more serious than last year, and we can expect that waterfowl will find fewer breeding areas this summer.

Summer rains continued in northern and northwestern parklands. As such, the good water conditions were maintained and improved over May results. Heavy rains in the central prairie in mid-July added materially to surface water. The center of this storm was Hanna, and Castor to Forestburg where better than 6 inches of rainfall within 3 days. Peripheral areas received lesser amounts and surface water increased therein. Otherwise the remainder of the survey area was without significant rainfall. These remaining areas were in severe drought.

With storms tending to break into the drought areas we may be experiencing the change in weather pattern for which we are looking. Any increase in surface water that has occurred this year is some insurance for the future--next season; it will have little effect this year in influencing total seasonal production of waterfowl. Waterfowl patterns had been set by earlier conditions.

Three-fourths of our survey area is still in a drought. Within the survey area our May water supply was 24 percent below 1961. These May indexes are the lowest recorded, and much of the survey area has had its surface-water areas reduced more than 75 percent. May water indexes were 43 percent below long-time averages.

Water economy on the survey area improved this year and will insure water for the broods present. The general area had three areas, where in 1961 there were two areas, or a 50 percent increase over 1961. This increase was caused to a lesser degree by subnormal temperatures and to a major degree by consistent rain in northern parklands and rather heavy rain over segments of the parklands and prairies. Part of our survey was done after 6 inches of rain had fallen in the south-central parklands and the north-central prairie. The quality of this new water was generally poor. Several growing seasons will be required to rehabilitate these potholes to good quality.

Within much of the short-grass prairies the only available water was artificial, i.e., dugouts and stock ponds. River courses, small stream courses, and irrigation districts provided the principal brooding habitat in stratum A. Southern and southeastern

parklands, normally the most productive, are still relatively dry. The extreme northern parklands increased in number of water areas from May to July. Rain from Edmonton east during June and early July was the cause. Seasonal rainfall below this northern wet belt is still below average.

### BREEDING POPULATION INDEXES

With the steady attrition of breeding habitat approaching serious conditions, the result is inevitable--loss of waterfowl breeding populations must follow. Minor changes in habitat can be taken in stride by waterfowl, but several unfavorable years in a row have reduced Alberta waterfowl indexes to their lowest state. The comparison of waterfowl indexes for 1962 with past records are given in tables E-6, and E-7 (pp. 96-97).

In comparing the total 1962 populations with 1961 averages, we find significant decreases in all categories, with one exception. A somewhat paradoxical situation exists. Stratum C, potentially our lowest production units, showed an increase in breeding population over 1961. However, this index is well below average conditions. This increase is due to puddle ducks of all species except the blue-winged teal. Apparently, the increased runoff in the south attracted these birds to the exclusion of much poorer conditions surrounding this stratum.

Strata A and C can be good producers of waterfowl. When they produce, they add the "cream to the crop." They are sensitive to conditions and vary more closely with the vagaries of a season. Stratum B, embracing the parklands, is the area that gives the "horsepower" to the development of any current waterfowl population. It can save any year from being a failure. Such cannot be claimed for the prairie, for when it is productive the parklands are more productive, and when it produces poorly the parklands will tend to remain productive. Only after prolonged conditions of several years (3 or 4) will the production in parklands fall below average conditions. Such is the case this year. The parklands appear to be at the breaking point, as it is the first year that the waterfowl breeding population in stratum B has fallen below average levels. The capital is largely gone from the short-grass prairie, and we

are beginning to cut into the capital reserve of the parklands.

All species showed reduction in number from 1961 except canvasbacks, ruddy ducks, and white-winged scoters. The major species, pintail, mallard, baldpate, shoveler, gadwall, blue-winged teal, and scaup, were significantly decreased from 1961. Reductions from long-term averages are even more striking. Again the principal species are adversely affected.

### PRODUCTION INDEXES

To begin our waterfowl breeding cycle our breeding-population indexes were at their lowest point. These show significant downward trends in all areas for all major species.

The waterfowl present had to commit themselves to available water in May. There is evidence that only part of them did stay to produce broods. The remainder left these breeding areas. The result was an exodus of adult ducks from the breeding grounds, and many of them could have found suitable habitat south in the United States. In this area conditions were excellent, especially the intermountain country. It was evident that few ducks remained "on location," because new water areas resulting from heavy rains were universally without ducks.

With a better water economy this season one might expect an increase in production. Such was not the case and the answer could be found in the quality of early season habitat. The change in indexes for young ducks decreased 32 percent and 45 percent in strata A and B, and stratum C was 5 percent above 1961. The Provincial index was 40 percent below comparative data for 1961. When one considers that 1961 was the poorest year, the present status of populations is brought into focus. This index can be tempered somewhat by adverse visibility factors in the parklands. With regular rains during late spring and summer lush growths of emergent vegetation resulted. This growth kept pace with the increase in water depth and the result was many choked potholes. Even with this allowance we are forced to conclude that the production of waterfowl in our Alberta survey area is the lowest we have recorded.

As stated above adult ducks were loath to remain for delayed activity. The exodus

of these birds was nearly complete in the principal breeding season. The result was that the late-nesting index was low to non-existent.

Habitat conditions, also, were not to the liking of the coot population. The only significant production of coots was found in the northern extremities of stratum B. Approximately 80 percent of the coots produced in our survey area were found in the upper four transects of stratum B. The Provincial coot-brood index was 19.165. This is very poor indeed when one considers that it is a decrease from 1961 of 61 percent. Also, this is a reduction of 66 percent from an 8-year average and 82 percent from 1958, which is our highest coot-brood index of record. The present coot index is a reflection of the reduced water found in northern parklands in May. Increased utilization by coots could not keep pace with increases in water during June and July.

The forecast index is 61 this year. This reflects the poor status of the season when it is compared with 71 for 1961 and 166 for the highest year (1958). The average index is 119.

## CONCLUSIONS

All factors measured in the July survey including numbers of broods seen, the numbers of single drakes and pairs seen, the status of water remaining in July, and the age class distribution of the ducklings observed indicate that in the Alberta prairies the production season was the poorest since these surveys were begun. In view of the poor production and the reduced nesting populations, it is believed that the fall flight from this important duck producing area will be the smallest in our records.

## WASHINGTON

Data supplied by Robert G. Jeffrey,  
Washington Department of Game

## WEATHER AND HABITAT CONDITIONS

The State of Washington experienced a cold nesting and early brood season, while potholes in the far eastern section of the State were substantially reduced by a poor

runoff. These factors resulted in a decline in duck production.

## PRODUCTION INDEXES

Duck production over the entire State declined 16 percent. The appearance of late-hatched broods have improved the duck prospects during July. Some further improvement may be expected when brood counts have been completed, but it is not expected that 1962 production will approach that of last year (1961).

Mallard production is expected to be decreased about 10 percent. Blue-winged teal and cinnamon teal have suffered the greatest decline, being down about 25 percent to date. The other dabbling species are down slightly, with the exception of the widgeon, which has shown over a 50 percent increase in the Douglas-Okanogan potholes. Diving ducks, as a group, have fared better, with redheads showing a good recovery throughout eastern Washington (table F-5, p. 111).

Basin Canada geese are expected to be down about 25 percent from last year. Displacement from nesting islands in the Ice Harbor dam pool contributed to the loss, although the decline in nesting was quite general. Our April survey accounted for a total of 533 nests, down 209 from 1961.

## CONCLUSIONS

It is anticipated that there will be an overall decline in the waterfowl flight from this State. This includes a significant reduction in the Basin Canada geese produced in the State of Washington.

## IDAHO

Data supplied by Elwood G. Bizeau  
Idaho Department of Fish and Game

## WEATHER AND WATER CONDITIONS

Generous amounts of moisture fell in Idaho from September 1961 to May 1962. Flood conditions prevailed in southeastern Idaho during late winter and early spring, but no floods of any consequence occurred elsewhere in the State. Irrigation reservoirs were at or near capacity by the

summer of 1962, with ample water assured for the waterfowl production season.

Flood losses of goose and duck nests occurred in some production units of southeastern Idaho.

Spring waterfowl movements were on schedule with numbers normal. The large pintail migration which moves through southeastern Idaho peaked near the end of March at about 375,000 birds. Spring movement of diving ducks was late and numbers somewhat below normal.

## BREEDING POPULATION INDEXES

Aerial trend counts were conducted on all major goose nesting units for the 8th consecutive year.

Total geese counted on the trend flights were down 10 percent from 1961, but still 19 percent above the 1955-61 average. Since all of the drop in trend numbers occurred in southeastern Idaho and only the southeastern units were down, it is possible that some of the decline in geese counted was due to a change in aerial observers for this area (table E-8, p. 98).

## PRODUCTION INDEXES

Canada goose nesting surveys were conducted for the 11th consecutive year. The results indicate production trend based on the number of nests hatched and hatching success found on identical areas surveyed in the same manner each year.

From 1961 to 1962 for all six Idaho units combined, gosling production was up 10 percent from 1961 and 6 percent above the long-term average (table F-7, p. 112).

The resident goose flocks of southwestern Idaho had a good production year while the largely migratory flocks of southeastern Idaho had a poor one. Production for the southwest was up 27 percent from 1961 and substantially above the long-term average. For southeastern Idaho, where flooding and wet spring weather adversely affected goose nesting in some units, production was down 19 percent from 1961 and well below the long-term average.

Duck production trend routes were censused in southeastern Idaho at Camas National Wildlife Refuge and Blackfoot Reservoir (table F-6, p. 112). Routes were run twice with all classes of broods counted

on the early July run and only class I broods included for the late July run. Brood trend routes in southcentral Idaho were operated only once, hence are not comparable to previous years' data and are not included in this report.

## CONCLUSIONS

Numbers of geese counted by aerial census on Idaho goose breeding areas were down 10 percent from 1961, but 19 percent above the 1955-61 average.

Goose production was below normal in southeastern Idaho, but good success in southwestern Idaho brought the outlook for the State up to 11 percent above 1961 and 6 percent above the long-term average.

Duck production was estimated to be at or above normal for Idaho owing to favorable weather and water conditions. Trend routes in southeastern Idaho indicated that duck brood abundance was 6 percent above the long-term average.

## OREGON

Data supplied by Chester E. Kebbe,  
Oregon State Game Commission

## WEATHER AND HABITAT CONDITIONS

Drought continues in the major waterfowl production areas in southeastern Oregon, and has caused a further decline in the production of both ducks and geese. Some improvement was recorded, however, in Warner Valley and on the Malheur Refuge, where the runoff from a late snow pack converted a small amount of parched land back to marsh. A great deal more precipitation is needed to return the marshes to normal conditions and full production.

In the south-central part of the State very little rain or snow fell during the year, and water levels continued to drop. Silver Lake dried up entirely in late spring, causing the loss of a large number of ducklings. Paulina Marsh, Sycan Marsh, and others remained dry and out of production.

## PRODUCTION INDEXES

The slight improvement in water conditions on Malheur Refuge resulted in doubling

the production of both ducks and geese over 1961, an extremely poor production year. Production is still far below that recorded in prior years when water conditions were normal.

Tables F-8 and F-9 (p. 113) present measurements on permanent transects elsewhere in eastern Oregon. Production is of little significance and is composed almost entirely of wood ducks and mallards.

Although wood ducks are extremely difficult to census, general observations and frequency checked in hunters' bags indicate that the population has increased many fold in recent years. This increase is perhaps due to the installation and maintenance of several thousand nest boxes.

## CONCLUSIONS

Sampling results on permanent transects show Canada goose production to be 24 percent below the production of 1961, and 22 percent below the average production of the previous 3 years. Duck production also indicates a decline of 9 percent and a decrease of 23 percent from the average production in the 3 years 1959-61.

Drought conditions continue to limit production in the marshes of southeastern Oregon, the major production area in the States.

## CALIFORNIA

Data supplied by J. R. LeDonne, F. M. Kozlik, and William Anderson, California Department of Fish and Game

## WEATHER AND HABITAT CONDITIONS

Water conditions in northeastern California were improved this year over the last 3 years, with nearly normal rainfall and snow pack in much of the area. These conditions were beneficial to this area, although many of the meadows, small reservoirs and lakes are still suffering from the past 3 years of drought and will probably be dry by midsummer.

The Central Valley received normal amounts of rainfall over the entire area. Cool weather prevailed during May and the first part of June. The rice and associated vegetation was 2 to 3 weeks later than 1961.

The spring was mild and migration began early. By April most of the birds had left the wintering grounds.

## PRODUCTION INDEXES

The breeding ground survey for 1962 was conducted in essentially the same manner as in previous years, consisting in complete aerial coverage of the "Great Basin" section in northeastern California and aerial transects in the Sacramento Valley, San Joaquin Valley and Bay Area. In the Klamath Basin the ground count was made by personnel of the Branch of Wildlife Refuges, Bureau of Sport Fisheries and Wildlife, supplemented by aerial survey work.

Where transects were used the same routes were followed, using two observers and a pilot. The plane was flown at 85 to 100 miles an hour and approximately 150 feet above the terrain. The observers covered a strip an eighth of a mile wide on each side of the plane, recording the number of pairs and single males observed. Where complete coverage was accomplished the same procedure was followed except that consecutive strips or passes were made across the individual marshes or reservoirs.

The survey flights in the Central Valley were conducted on May 22 and 23, while northeastern California was flown from June 4 through June 8. Before 1960 a special early flight to record Canada geese was made in early May while the nesting season was still in progress. From the early flight the number of paired geese and the number of groups (nonbreeders) were recorded. Then on the regular breeding survey in June the number of young birds was recorded and added to the population. This is the third year that only the June flight was made, and all geese were recorded at that time. Using this method the number of paired geese recorded for the years 1960 through 1962 are not comparable to those shown for previous years, as only adults with young were recorded as paired for 1960 through 1962. Pairs of geese that failed to nest, lost their young are now all grouped as nonbreeders. However, the figures shown in the fall population indexes are still comparable, as they included all categories of geese and comprise the total population.

A summary of nesting pairs of waterfowl for the past 4 years together with final fall

populations including young and residual adults is shown in tables F-11 and F-12 (pp. 114 and 115). In most instances the numbers of nesting pairs given are more accurate than the fall population indexes.

## CONCLUSIONS

A 6-percent decrease in pairs and a 7-percent decrease in total fall population of Canada geese was indicated from the surveys in 1962. The survey also revealed a 26-percent decrease in breeding pairs and a 12-percent decrease in total fall population of ducks from 1961. The total fall population of coots decreased 41 percent from 1961.

## NEVADA

Data supplied by Vic Oglesby  
Nevada Fish and Game Department

### WEATHER AND HABITAT CONDITIONS

Water conditions were greatly improved this year in Nevada and in direct contrast to the past 3 years, the water supply outlook for 1962 was excellent. February and early March storms produced mountain snowfall and valley precipitation several times normal. Winter floods occurred along the Humboldt River drainage, and reservoir storage was greatly improved generally throughout the State.

Despite this year's improved water picture, Stillwater and other marshes in Lahontan Valley dependent upon waste irrigation flows did not receive sufficient water during the nesting season to greatly increase production in this area. Most of these areas, including Stillwater, were almost completely dry last year.

May precipitation was moderate to heavy in the northern part of the State, causing a delay in the nesting season from 2 to 3 weeks.

### BREEDING POPULATION INDEXES

Nesting pair data recorded during aerial and ground surveys are presented in table E-9 (p. 98). Duck nesting populations declined slightly again this year despite

improved water conditions. The breeding population index dropped 7 percent from 1961 and is 63 percent below that of 1959--last good production year in Nevada. Canada goose nesting populations were up 26 percent over 1961 and, unlike the breeding duck populations, have remained fairly stable throughout the 1959-62 periods.

## PRODUCTION INDEXES

Duck production for the State shows an increase of 58 percent over 1961 but is still down 52 percent from the 1959 production level. Canada goose production increased 56 percent over 1961 and is 40 percent over the 1959 level. Table F-13 (p. 115) shows production trends for the years 1959-62 on comparable areas.

## CONCLUSIONS

Despite a slight decrease in the duck breeding population, as indicated by the breeding pair surveys, duck production increased significantly over that of last year (1961). However, it is still far below a normal production year, and contribution to the fall flight of ducks in the Pacific Flyway will again be relatively small for Nevada. Water conditions have improved considerably and habitat conditions will be greatly improved this fall.

## UTAH

Data supplied by Donald A. Smith  
Utah Department of Fish and Game

### WEATHER AND HABITAT CONDITIONS

Utah received an abrupt reprieve from the serious drought experienced in 1961. Above-normal moisture was received throughout the winter. Heavy rains and snows plus runoff from an unseasonal thaw in February overflowed most marshes, both managed and natural. Abundant snows in mountainous areas have provided adequate water to maintain most of these areas through June. The outlook for the remainder of the summer is excellent.

### BREEDING POPULATION INDEXES

Both aerial and ground census methods were used to census duck-breeding

populations in Utah in 1962. Established aerial routes were traversed in Box Elder, Weber, Davis, Salt Lake, and Utah Counties. These routes provide a sample of 108.6 miles of breeding habitat.

Aerial survey data indicate that duck breeding populations in Utah were down by 3.4 ducks per square mile from 1961 (table E-10, p. 99). The most noticeable decline was in Utah County where birds per square mile dropped from 48.0 in 1961 to only 15.9 in 1962. The other recorded drop was in Box Elder County. Weber and Davis Counties plus the Jordan River Club marshes showed significant increases in breeding ducks which nearly offset losses in the other two counties. Populations in Salt Lake County remained essentially the same as a year ago.

Ground surveys made on Department-owned Waterfowl Management Areas, showed significant increases in total breeding pairs of ducks from 1961 (table E-11, p. ). Some noticeable changes in species composition were recorded on these counts. All four trend areas showed drops in breeding mallards and heavy increases in red-head. Gadwalls were up on all areas except Farmington Bay Waterfowl Management Area, where they remained essentially the same. Shovelers increased on all areas except Ogden Bay Waterfowl Management Area. Combined census data from both managed and unmanaged marshes of northern and southern Utah show some of these same trends in species composition.

## PRODUCTION INDEXES

The production of Canada geese was determined through both aerial and ground

methods. Breeding populations of this species are not censused, but brood counts are made to determine the annual increment to the population. Production on Management Areas and on some southern Utah reservoirs and marshes is determined by ground counts. Aerial surveys are made on the more extensive habitat in northern Utah.

All trend areas but two remained about the 1961 production level or increased. (table F-14, p. 116). Production on Cutler Reservoir in Cache County and Wales Reservoir in Sanpete County dropped over 50 percent from 1961. The reason for the decline on Wales Reservoir is not known. It is speculated that the abundant water available in marshes in February and early March flooded much of the nesting habitat (islands) on Cutler Reservoir. This body of water is maintained for irrigation and power purposes. Through verbal agreement the water level has been held down until after the goose nesting season, but the unexpected floods early in the season could not be fully controlled.

Statewide totals reveal slight increases in both the number of broods and the total young geese produced.

## CONCLUSIONS

It is anticipated that there will be little change from last year in the fall flight of ducks since the improvement in production probably offset the slight decrease in breeding pairs. The fall flight of geese will be slightly better than in 1961.

# CENTRAL FLYWAY WATERFOWL KILL SURVEY

An estimated 800,000 ducks were bagged in the Central Flyway during the 1961-62 waterfowl season, a decrease of 43 percent from the 1960-61 season (table A-4, p. 60). An additional 226,000 ducks were knocked down but not retrieved, yielding a total kill (bag plus cripples) of 1,026,000 ducks, a decrease of 45 percent from the previous season.

The Flyway bag of mallards as derived from data provided by the duck wing survey, totaled 432,500 birds (table A-4, p.60), or 54 percent of the total bag of all species. The bags of green-winged teal (101,000), lesser scaup (53,000), American widgeon (52,600), and pintails (50,700), together with mallards, comprised over 85 percent of the entire Flyway bag of all ducks.

Because the 1961-62 season marked the first year of the duck wing survey in the Central Flyway, the subsequent estimates of bag by species which are based on the findings of that survey are not strictly comparable with those of the previous season, derived from the hunter questionnaire. For this reason percentage changes in the bags of species have not been computed even though in general they might be reasonably accurate. (It was hoped that the 1961-62 species estimates based on questionnaire responses could also be presented in this report, but current work demands have thus far made the analysis impossible.).

Although the 1960-61 estimates of total ducks bagged by States may be subject to considerable variation due to small sample size, only two States, Montana and New Mexico, seemed to show increases in bag this year (table A-5, p. 61). Any increase in the Montana bag would be due in part to the liberalizing of regulations west of the

Continental Divide, and the New Mexico estimate, which accounted for less than 1 percent of the Flyway total, is probably not too sensitive owing to sample size. All other States registered marked decreases in total duck bag, ranging from 30 percent in Nebraska to 62 percent in North Dakota.

The total estimated goose bag of 197,000 birds dropped 8 percent from the previous year. An additional 43,000 geese were knocked down but not retrieved, for a total kill of approximately 240,000 geese.

An estimated 12,900 coots were bagged, a decrease of 47 percent. An additional 9,000 coots were knocked down but not retrieved, for a total kill of approximately 22,000 coots.

A total of 215,640 waterfowl hunters were active during an estimated 1,231,000 hunter-days, decreases in these measurements of 30 and 34 percent, respectively, from the previous season (table A-6, p. 62).

## WING COLLECTION SURVEY

Flyway-wide age ratios of the more important species of ducks in the kill during the 1961 hunting season in the Central Flyway are listed in table B-2, (p. 70). Central Flyway ratios of immature to adult mallards were the lowest in the continental United States in 1961-62 (table B-3, p. 71). Age

ratios in North Dakota contained fewer immatures per adult in 1961-62 than did supplemental wing collections made the previous year in that State suggesting a decline in the number of immatures per adult. Species composition in the Flyway kill is shown in table B-5 (p. 73).

## WINTER SURVEY

Data supplied by Raymond J. Buller, Flyway Representative,  
Bureau of Sport Fisheries and Wildlife

## FACTORS AFFECTING SURVEY

Weather conditions during the survey were such that visibility was excellent and coverage was completed throughout all sections of the Flyway except Montana, Colorado, Wyoming, and the upper Texas coast in a minimum of time. Water areas in the northern and central portions of the Flyway were generally ice-covered, and waterfowl were largely confined to streams and rivers. Blizzards and subzero temperatures delayed conduct of the survey in Montana, Colorado, and Wyoming. Inclement flying weather delayed a second coverage of

several of the important goose wintering areas on the upper Texas coast. The blizzards that delayed initiation of the survey in Montana, Wyoming, and Colorado may have caused some groups of birds to have been omitted from the survey entirely, or to have been tabulated more than once.

Waterfowl food supplies throughout the Flyway ranged from fair to excellent, which also typifies the general habitat conditions. Very little waste grain and other foods were available for North Dakota wintering birds, and snow cover prevented birds in Montana

from utilizing waste grain in stubblefields. Waste grains and natural waterfowl foods were generally ample and readily available in South Dakota, Nebraska, Wyoming, Colorado, Kansas, Oklahoma, and parts of Texas. Hurricane Carla alleviated the early fall drought conditions that existed along the Texas coast, but salt-water intrusion resulting from the Hurricane deteriorated coastal marsh food and habitat conditions favored by wintering birds. Subsequent rains alleviated these conditions somewhat, but birds wintering on the upper Texas coast scattered widely in search of food in rice fields and pastures. Habitat conditions in interior Mexico were generally poor. Water levels in many of the areas were 30 percent or more lower than last year; some were completely dry. None of the weather or habitat conditions seriously interfered with the survey, however, and coverage throughout the Flyway was comparable to that of previous surveys.

(United States portion of the Flyway) as follows:

|                     |        |
|---------------------|--------|
| Mallard             | - 38.9 |
| Gadwall             | - 32.7 |
| Baldpate            | + 12.5 |
| Green-winged teal   | - 41.4 |
| Blue-winged teal    | - 43.6 |
| Shoveler            | - 45.7 |
| Pintail             | - 47.2 |
| Wood duck           | + 96.5 |
| Mottled duck        | +111.2 |
| Redhead             | - 34.9 |
| Ring-necked duck    | - 15.3 |
| Canvasback          | - 54.6 |
| Scaup               | - 76.7 |
| Goldeneye           | - 11.9 |
| Bufflehead          | - 41.4 |
| Ruddy duck          | - 54.3 |
| Merganser           | - 7.8  |
| Blue and snow geese | - 31.5 |
| White-fronted geese | - 27.4 |
| Canada geese        | - 6.0  |
| Whistling swan      | - 22.7 |
| Trumpeter swan      | +400.0 |
| Coots               | - 30.5 |

## POPULATION TRENDS

The winter survey of 1962 in the Central Flyway revealed a serious decline in the waterfowl population as a group. As of January 1962, in this Flyway waterfowl stood 21 percent below the 1961 level and 37 percent below the average status of the past 7 years.

When the major groups of waterfowl wintering in the United States was considered separately, their population status was found to be as follows: Dabbling ducks were 12.5 percent below 1961, 38.6 percent below the 7-year average; diving ducks were 35.4 percent below 1961, 46.9 percent below 7-year average; dabbling and diving ducks together were 16.4 percent below 1961, 39.1 percent below 7-year average; geese were 14 percent below 1961, 22.7 percent below 7-year average; coots were 37.6 percent below 1961, 30.5 percent below 7-year average; and the status of the total waterfowl population shows a decrease of 17 percent from the 1961 level and 37.3 percent below the 7-year average.

Status of individual species are illustrated by a comparison of the 1962 population estimates with the 7-year average

Tabulations show a downward trend for the species (mallard, green-winged and blue-winged teal, and pintail) which make up about 80 percent of the duck bag in the Flyway. The mallard, which accounts for about 50 percent of the bag, was down significantly despite a drastic curtailment in the hunting regulations last fall.

Among the dabbling ducks, only the baldpate, the wood duck, and the mottled duck showed an increase; however, too few of the latter two species are found in the Flyway to attach significance to the increase.

All of the diving ducks showed a decrease; however, only the populations of the redhead and scaup are important enough to be considered. The annual status of the wintering redhead population continues to fluctuate greatly and comments from field personnel along the lower Texas coast would indicate that the decrease was more apparent than real. The scaup decrease is probably the result in a population shift in recent years from the lower Texas coast to the Louisiana coast where some  $1\frac{1}{2}$  million of these birds were recorded during the 1962 midwinter survey.

The numbers of wintering blue and snow geese account for the major part of the decrease in the status of total geese. Inclement weather in the Arctic during the breeding period for these birds resulted in poor production and these birds showed a decrease of 31.5 percent from the 7-year average. Canada goose numbers remained relatively unchanged. White-fronted geese showed a substantial increase over 1961 but were almost 30 percent below average. A significant wintering population of these birds (20,000) was again recorded in Louisiana during the survey, and it begins to appear that accurate estimates of the white-fronted goose population, like the redhead population, is a problem of logistics.

The coot, a relatively unimportant game bird in the Central Flyway, showed a decrease of 30 percent from the average.

Texas and Mexico wintered 70.5 percent of the recorded Flyway waterfowl population; the Texas population shows a slight increase over last year, interior Mexico,

a small decrease; and the east coast of Mexico no change. Distribution of wintering waterfowl among the States of the Flyway was relatively unchanged from 1961.

Compared with the composition of the 1961 population, the composition of the 1962 population remains relatively unchanged. Mallards continued to be the most numerous species (32.5 percent), followed by pintails (13.1 percent) and redheads (7.3 percent).

Although no concerted effort was made to assess the size of the wintering lesser sandhill (little brown) crane population during the midwinter survey, population surveys were conducted in the areas open to hunting (west Texas and eastern New Mexico) before and after the season which was permitted November 4 to December 3, 1961. The preseason population was estimated to be about 150,000 birds; the post-season population approximated 165,000.

For further information concerning the winter survey in the central Flyway, refer to tables in appendix C.

## BREEDING GROUND SURVEY

### SOUTHERN SASKATCHEWAN

Data supplied by Joe M. Matlock and H. V. Hines, Bureau of Sport Fisheries and Wildlife

### WEATHER AND HABITAT CONDITIONS

On May 4, 1962, the first transect was started from Regina. This flight was soon terminated because of blowing dust and winds up to 55 miles an hour. On May 6 the flights were started again, and they were completed on May 19. All stops were pulled by the "rainmakers," and we had rain, snow, fog, below freezing temperatures, and balmy 75° weather. Saskatchewan is the only place other than Texas where you can stand in mud and have dust blowing in your face.

At first reading of the total pond tabulations for the Province, it appears that water is not the problem it was the last few years (table D-2, p. 89). But this is not true by any stretch of imagination. While it is true, more or less, that figures do not lie, the water areas in B-East and B-West are certainly misleading. This area had many water areas, and although they met

the norm for standard recording, they were of a temporary nature. This was caused by a heavy thunderstorm that moved over the area and deposited considerable moisture. The potholes had water in them at the time of the survey but could not be expected to hold it for more than a few days if additional rain did not fall. Ducks were noticeable by their absence on these areas. A snowfall the week before we were over the area also contributed to the false illusion of water areas. Forest fires last summer and early winter in the B-East area rendered many potholes unfit for duck use, owing to debris, ashes, etc., in these areas. The ground crews on the special study areas found, for the most part, more water than last year (1961); most of this seemed to be of a recent and temporary nature. Whereas these water areas were more numerous than last year, the duck population was less. And even on some of the better water, that is, water that presumably would hold through the nesting season, the ducks were not there.

Ponds in July were up 44 percent in 1962 as compared with 1961. This, on the surface, looks very encouraging indeed. However, it was the result of rains that came too late to help waterfowl production for this

year. It is possible that if rains continue to fall and soak the ground enough to permit a frost seal during the winter, the spring runoff next year may remain in these potholes.

The following is an excerpt from the Regina newspaper with a dateline of July 21, 1962:

While stands of grain in the Weyburn district are still excellent, they are approaching the critical stage for moisture, Weyburn agriculture representative said Friday. Crops are starting to deteriorate due to the lack of subsoil moisture.

This is substantially the same situation existing over the entire Province. While local showers have kept the crops in good condition, the only surface water to be found is in dugouts for the most part. The ground crew, in several instances, made pictures of hay cutting and baling operations in dry potholes.

The ice was still on Candle Lake as late as May 20. This is a rather small lake, only 35 miles northeast of Prince Albert. Dore Lake, Lac la Ronge, and all of the large lakes were still solid with ice at this time. Prince Albert had below freezing temperatures every night until May 15. The air crew did not see a single duck on a nest during the entire flight. The ground crew reported finding one nest. This was up to May 20. So it appears that, without question, the nesting effort was several days behind schedule for southern Saskatchewan. The potholes in the western portion of A-West and in all of C-West were sandpiles. Even with hard and continuous rainfall at this late date, production would be negligible here. The other areas having a substantial amount of water running into potholes that were pretty well saturated now, could conceivably aid duck production to a great extent. This is on the premise that rain, and lots of it, starts falling on this parched earth immediately.

## BREEDING POPULATION INDEXES

In every stratum in southern Saskatchewan, all species of both puddle and diver ducks were down numerically, (tables E-12 and E-13, pp. 100 and 101). Puddle ducks decreased 50 percent and divers 25 percent, from the 1961 survey. Coots decreased 50 percent from 1961. Few, if any, transients were noted over the northern transects. On the basis of reliable reports from the Prince Albert area, it is believed migrants had

already moved north of the last transect in both B-East and B-West.

## PRODUCTION INDEXES

The brood index was down approximately 50 percent from last year (tables F-15 and F-16, pp. 116 and 117). This situation is of increasing importance, since the 1961 brood index was down 45 percent below 1960. Ducklings in class II and class III broods averaged 4.96 as compared with 4.6 last year.

Coot broods were nonexistent. Only one brood of coots was seen over the entire survey and less than 20 pairs of coots were observed.

## CONCLUSIONS

Because of the lack of surface water and because the population of breeding ducks is the smallest ever to return to this area since the beginning of the surveys, the poorest fall flight on record is forecast for Saskatchewan prairies.

## MONTANA

Data supplied by Dale Witt  
Montana State Fish and  
Game Commission

## WEATHER AND HABITAT CONDITIONS

Water conditions during the May survey in the glaciated subdivisions showed improvement in two areas and a decline in the other two (table D-3, p. 90). The improvement of water conditions in the two Hi-Line areas came after the main migration of waterfowl occurred.

Water conditions in the unglaciated prairie were improved over previous years. Most of the waterfowl habitat in this area is of the stockpond type. The number of reservoirs at the time of the survey tripled over last year (1961). In the latter part of May and the first of June water conditions throughout the survey areas were greatly improved. Flood conditions were reported in many eastern Montana areas.

Water conditions in the Flathead trend area were excellent owing to a late cool spring and above normal precipitation.

## BREEDING POPULATION INDEXES

The 1962 May survey of the glaciated subdivisions indicated a decrease in total ducks over last year and was down in most areas from the 13-year average (table E-14, p. 101). The Great Falls-Piedmont was the only area that showed an increase in waterfowl, and this increase was partially due to a couple of large rafts of ruddy ducks encountered on one transect.

The number of breeding waterfowl in the Flathead Valley area is one of the highest recorded (table E-15, p. 102).

In the unglaciated McCone County trend area there were 1.5 ducks per square mile. This is an improvement from the previous 3 years. The increase in the duck population in this area could easily offset the decrease in the glaciated area. Although the water area and waterfowl densities are low in the unglaciated prairies, the number of square miles of this type habitat is considerably greater than the glaciated.

There was a slight increase in the breeding pairs of Canada geese observed on the areas surveyed compared with 1961. (table E-16, p. 102).

## PRODUCTION INDEXES

The only area where duck production data are gathered is in the Flathead Valley area. The number of broods and the brood size in this area showed improvement from last year.

Production and brooding conditions in eastern Montana in both the glaciated and unglaciated prairies are very good owing to the late spring and early summer rains in the area.

The Canada goose census on the Hi-Line unit indicates a possible increase in breeding birds over last year (table F-17, p. 118). However, the production census on this unit shows fewer young being produced this year.

The area showing the largest production decrease was in the Bowdoin Refuge which had extremely poor water conditions during the goose nesting season.

On the East Slope unit the trend in population during the nesting season improved slightly from last year.

The population trend during the nesting season on the Helena unit indicates no change from the previous year. The produc-

tion trend on this area remained about the same or possibly down slightly.

The production trend in the Flathead Valley unit may be slightly lower than last year and also down from the 8-year average.

The data from all areas indicate a 22.3 percent decrease from last year and an 18.5 percent decrease from the 8-year average. This decrease may be exaggerated because of a poor count in the upper end of Flathead Lake. The Flathead River below the lake was down considerably from last year.

## CONCLUSIONS

Although water conditions were considerably improved over 1961, the improvement occurred largely after the spring migration. Apparently, waterfowl breeding populations were down slightly from 1961 in some areas, but this may have been offset by an increase in the unglaciated areas. For the State as a whole it is believed that there will be no change in the fall flight of ducks.

The increase in breeding pairs observed of Canada geese on the Hi-Line unit was offset by poor production and it is expected, therefore, that the fall flight of this species from the State will be about the same as in 1961.

## NORTH DAKOTA, SOUTH DAKOTA, AND WESTERN MINNESOTA

Data supplied by Glenn Orton, David Fisher, and Gerald Pospichal, Bureau of Sport Fisheries and Wildlife

## WEATHER AND HABITAT CONDITIONS

The late winter and spring months of 1962 brought heavy accumulation of snowfall in the east strata of Minnesota and the Dakotas. Spring temperatures held below normal and delayed farming operations. The spring runoff was generally disappointing, as most of the melting snow was absorbed into the subsoil; however, it was very rapid in the Red River Valley and southeast South Dakota, where some flooding occurred.

Rains after the eighth of May were heavy over the entire area and flooding of small streams was in evidence except in the

extreme west stratum of South Dakota and the central and westcentral strata of North Dakota.

Emergent and shoreline vegetation was making rapid growth in areas where cover remained from last fall. Aerial observations were not hampered, however, many water areas in the east and central strata, now holding water, were dry during the summer and fall of 1961. Farming operations were intensive on most of these dry areas, eliminating all nesting cover.

As indicated in table D-4 (p.90) the May water index for the tri-State area is 151 percent higher than the index of 1961.

Late spring and early summer were characterized by below normal temperature. Heavy and frequent rainfall covered most of the tri-State area. Pothole levels rose beyond their natural boundaries. Some flooding of cropland was observed in Minnesota and South Dakota, and in the east stratum of North Dakota.

Emergent vegetation made rapid growth and hampered air to ground visibility. Many of the pothole basins which were dry and under cultivation in the summer and fall of 1961 were holding water this year.

Farming operations in Minnesota and South Dakota were delayed by wet-field conditions, and some crop harvests were late. Rangeland in the west stratum was in excellent condition and stockponds in South Dakota held maximum levels. Statewide water conditions in South Dakota showed greater improvement over 1961 than either North Dakota or western Minnesota. Water levels dropped only 19 percent from the May observations.

## BREEDING POPULATION INDEXES

Table E-17, (p. 103) shows the population breakdown by species in the tri-State area. The nesting effort appeared to be well under way as indicated by the 73.9 percent lone drakes in the survey area. Total dabbling ducks showed a 62 percent increase over 1961 with increases of 103 percent in pintails, 222 percent in shovanders, and 137 percent in gadwalls. Mallards showed an increase of 23 percent and blue-winged teal 24 percent over 1961. Total diving ducks increased 42 percent over 1961 with redheads showing the largest increase (+191 percent). Canvasbacks showed a decline of

32 percent over last year. Nesting cover for the over-water nesters is in poor condition in many areas. The coot index for the tri-State area increased 41 percent.

Waterfowl breeding populations for the period 1958-62 are given in table E-18, (p. 103).

## PRODUCTION INDEXES

Total duck broods in the tri-State area showed a 22 percent increase from 1961.

Brood production was not up to the high potential indicated by the May breeding pair counts. Because of the high late-nesting index (97 percent), it is felt that a substantial part of the early nesting efforts failed, probably because of flooding from excessive rains during early May through July. Mallards and blue-winged teals comprised approximately 70 percent of the late nesting index. Flocks of both sexes of dabbling and diving ducks were observed on molting areas and did not appear to be renesting. No canvasbacks were observed during the July survey. Coots showed a 35 percent increase in the tri-State area.

Waterfowl production data by strata and for the years 1959-62 are given in tables F-18 and F-19 (pp. 118 and 119).

## CONCLUSIONS

The substantial improvement in water conditions and the great increase in breeding pairs of ducks observed in this tri-State area might have produced a bumper duck crop; however, production surveys indicate a disappointing production season actually occurred. Even though the number of broods observed was not up to expectations, it is certain that the fall flight from this area will be significantly better than in 1961.

## NORTH DAKOTA

Data supplied by Charles H. Schroeder,  
North Dakota Game and  
Fish Department

## WEATHER AND HABITAT CONDITIONS

Water conditions in North Dakota during the breeding-ground survey in 1962 were

much better than they were in 1961, and were similar to those of 1960. The 1962 water index was 100 percent above the 1961 index, but was 7 percent below the 1948 through 1961 average index. The Statewide water index of 1962 could be a bit misleading since water conditions in parts of the central and northwestern parts of the State were as poor as they had been in 1959. It was the very wet eastern part of the State that helped raise the 1962 water index.

A comparison of the 1962 water index with the 1948 through 1961 average index and with the 1961 index is presented in table D-5 (p. 90).

Water conditions in North Dakota at the time of the mid-July survey were much improved from what they were in 1961. The 1962 water index of 5.33 represented an increase of 1,084 percent over the 1961 water index of 0.45, and 76 percent above the 1958-1961 average water index of 3.03.

## BREEDING POPULATION INDEXES

The 1962 breeding waterfowl index includes a correction factor of 1.27 to account for absent females. The correction factors for preceding years were 1.22 in 1961, 1.33 in 1960, 1.23 in 1959, 1.24 in 1958, 1.33 in 1957, and 1.24 in 1956. The 1962 breeding waterfowl index was 10 percent below the 1961 index, 1 percent below the 1960 index, 1 percent below the 1960 index, and 14 percent below the 1948 through 1961 average, (table E-19, p. 104).

The species indexes for 1962 indicated that blue-winged teal, mallards, gadwall, baldpate, redheads, canvasback, and scaup experienced a decrease from the 1961 indexes; and these species, except gadwall, also showed a decrease from the 1948 through 1961 average indexes. The species indexes for 1962 indicated that pintails, shovanders, green-winged teal, and ruddy ducks experienced an increase over the 1961 indexes; and these species, except pintail, also showed an increase over the 1948 through 1961 average indexes.

An indication of the progress of nesting activities can be obtained by examining the ratio of lone drakes to paired drakes. A high ratio of lone drakes to paired drakes

at the time of the breeding-ground survey would suggest that the waterfowl nesting season was well advanced, while a low ratio would suggest that the nesting season was delayed, or that early nesting attempts were not very successful. The lone drakes to paired drakes ratios obtained in 1962 would suggest that the nesting season was more advanced than it was in 1961 and was about the same as the 1956 through 1961 average (table E-20, p. 104).

## PRODUCTION INDEXES

The 1962 mid-July brood index (broods per square mile) of 0.66 was 30 percent below the 1960 brood index of 0.94, and 51 percent below the 1955 through 1960 average brood index of 1.36. Comparable brood data were not obtained in 1961.

The average number of ducklings per brood in 1962 was 8.0 as compared with 6.2 in 1961, 8.8 in 1960, 7.0 in 1959, 8.0 in 1958, 7.7 in 1957, 7.3 in 1956, and 7.7 in 1955.

The distribution of duck broods in 1962 by age classes I, II, and III were similar to the 1955 through 1961 average (table F-21, p. 119).

Water and vegetation conditions in North Dakota in 1962 were much different from those experienced in 1961. Water conditions continued to improve during the summer of 1962, and the growth of wetlands vegetation was very profuse. The dense vegetation severely limited observation into many of the water areas, and as a result the brood index obtained was considered by both observers to be much lower than the number of broods probably present.

An unusually high number of adult pairs of all species were observed during the mid-July survey. A large number of pairs may have represented a large loss of nests by flooding and washing, as a result of the heavy rains.

## CONCLUSIONS

The fall flight of ducks from North Dakota in 1962 is expected to be considerably above that of 1961 and similar to that of 1960.

## SOUTH DAKOTA

Data supplied by Curtis M. Twedt,  
Department of Game,  
Fish and Parks

### WEATHER AND HABITAT CONDITIONS

Water area conditions in South Dakota in 1962 showed marked improvements over conditions prevailing in 1961. Heavy snowfalls began throughout the State in mid-February. Season totals of 5 feet of snow were common in the southeast and south-central parts of the State. Runoff was sufficient to establish good water levels in potholes, sloughs, and artificial water areas throughout most of the State.

Precipitation during April and early May was generally one-half to 1 inch less than seasonal normals. Heavy rains began in mid-May and precipitation since has been frequent and general. Precipitation received from April 1 to July 15 was approximately 5 inches greater than seasonal normals for the State (based on records of 14 weather stations).

The May 1962 pond index of 4.83 pounds per square mile exceeded the 1961 index by 178 percent and was 16 percent greater than the 12-year (1950-61) average. The 1962 May pond index was at the highest level since 1957, when the index was 5.04.

The Statewide, mid-July pond density index was 8.38 ponds per square mile in 1962, compared with 2.29 in 1961, an increase of 266 percent. The mid-July index was 177 percent greater than the 9-year (1953-61) average of 3.02 pounds per square mile.

The 1962 mid-July pond index was at the highest level since production surveys were begun in 1953 (table D-6, p. 91).

### BREEDING POPULATION INDEXES

The 1962 breeding population index of 558,000 was 80 percent greater than that of 1961 and nearly 3 percent greater than the 12-year (1950-61) average of 543,000 ducks. The Statewide density index of 7.58 ducks per square mile was greater than any year since 1956, when the index was 7.64. The 1962 density index of 13.18 ducks per square mile in stratum 2 (Central) represented a level approaching the Statewide

density indexes of 1952 and 1953 (13.37 and 13.65, respectively) (table E-21, p. 105).

Random field checks during spring and early summer seemed to indicate an increase of numbers of nesting mallards, redheads, and canvasbacks over the relatively low population levels of these species in 1961.

### PRODUCTION INDEXES

The Statewide, mid-July brood density was 0.60 in 1962, compared with 0.45 in 1961 (table F-22, p. 120). The change indicated a 35 percent increase in brood density. The 1962 index was also 35 percent greater than the 9-year (1953-61) average of 0.45 broods per square mile. Duckling mortality due to habitat deterioration should be relatively low in 1962.

### CONCLUSIONS

Excellent water conditions and a relatively high duck brood index in South Dakota should bring about a substantial increase in the fall flight of ducks over that of 1961. Duck production in 1962 may approach recent peak-year production levels of 1953 and 1954.

## NEBRASKA

Data supplied by George Schildman,  
Nebraska Game Forestation  
and Parks Commission

### WEATHER AND HABITAT CONDITIONS

Water conditions were good to excellent throughout those parts of the Nebraska Sandhills surveyed during the breeding-ground survey. Survey flights were made during the period May 15 through May 24, 1962.

Northern parts of the eastern and central Sandhills areas experienced record or near record amounts of rainfall during the spring and early summer breeding and brooding periods. The additional water with the already fair to good conditions caused considerable rises of water levels. Flood conditions existed in many areas for sometime.

A few areas for some time. A few areas remain at flood stage at present (July 25, 1962).

Western and southern parts of the Sandhills area were fair to good at the time of the survey. Subsequent rainfall has put the area in good to excellent condition. These same parts of the western and southern Sandhills breeding are were generally very dry until approximately the second week in May, however, or until after the main spring migrational movements.

Comparatively cool weather and continued rains aided in maintaining water levels at or near record levels. Most of the rainfall throughout the Sandhills occurred after the spring migration period. As a result, the breeding populations did not remain in the area and much unoccupied territory now exists.

Water conditions throughout the Nebraska Sandhills were much better than at the same period in 1961.

The rainwater-basin area of south-central Nebraska was rather short of water until after migration period. Rains in late May restored water to near normal levels. The eastern basin area was suffering from low water levels by mid-July, while good water prevailed in the western part.

Weather conditions during the spring and early summer have been relatively cool with above normal rainfall. It was very dry in western and southern parts of the Sandhills during the early spring period.

The unusual amounts of rainfall in the northern parts of the area caused considerable flooding of lowlands, resulting in a high nest mortality.

Violent rainstorms accompanied by severe hail in some areas undoubtedly took their toll, though their local nature would not have too much effect on the area as a whole. One rainstorm measured at 10 inches was recorded in Cherry County, while a severe hailstorm was known to have caused waterfowl fatalities in Southern Holt and Rock Counties.

## BREEDING POPULATION INDEXES

The 1962 aerial breeding-ground transects were flown over part of the Sandhills breeding area during the period May 15 through May 24, 1962. Adverse weather conditions did not permit completion of the entire series of transects.

Aerial transects were flown over the Sandhills waterfowl breeding areas during the period May 15 through May 24, and over the south-central basin area May 31, 1962. The calculated duck breeding population for the Sandhills was 68,900 and 10,114 for the south-central basin area. These data represent a decrease of 51.4 percent from last year in the Sandhills and 37.8 percent decrease for the south-central area.

A total of 828 transect miles was flown (71.9 percent of last year's survey) in the Sandhills for a coverage of 207 square miles for the sample. In the south-central area, 324 transect miles were flown sampling 81 square miles.

The calculated population index for stratum A is 59,712 ducks, while the calculated population index for stratum B is 9,028 ducks. The index for stratum A is down 53.6 percent from 1962, while stratum B is down 31.0 percent (table E-22, p. 105).

## PRODUCTION INDEXES

Aerial brood transects were flown over the Sandhills parts of the breeding area during the period July 9-17. The rainwater basin was not flown.

A total of 14 broods with 63 ducklings was observed. Broods decreased 71.4 percent and the number of ducklings was down 55.9 percent from the 1961 figures, (table F-23, p. 120).

The hatch appears to be later than normal this year and is also somewhat irregular. This was expected, however, with the early dry conditions followed by flooding conditions in many areas. Attesting to the high degree of nest destruction due to flooding was the fact that lone males, females, and pairs were frequently sighted on the transects during the time of the flights and on ground routes driven immediately following the aerial survey. Also indicating a great deal of renesting is the fact that 57.1 percent of the broods were aged class I. Newly hatched broods were still appearing by July 25.

## CONCLUSIONS

The 1962 waterfowl production in the Nebraska Sandhills will be considerably less than that of 1961. Late broods may offset the decrease in production somewhat,

but will not nearly make up for the reduced number of breeding pairs. Waterfowl production in Nebraska may be as much as 50 percent less than last year.

## COLORADO

Data supplied by William H. Rutherford  
Colorado Game and  
Fish Department

### WEATHER AND HABITAT CONDITIONS

Weather and water conditions in Colorado during the spring and early summer were considered to be excellent for waterfowl nesting and production. In general, water levels Statewide were higher than normal. In eastern Colorado, most sloughs and ditches, and all reservoirs, were full; and in North Park and on the western slope, meadows were flooded and water surface area was greater than normal. Highcountry snow pack appears to be good, and mid-summer water supply should hold up well. In summary, overall weather and water conditions in Colorado seem to point toward an excellent year for waterfowl production and brood rearing.

### BREEDING POPULATION INDEXES

Examination of the duck breeding-pair estimates by area reveal that the 1962 total counts were increased 22.1 percent from 1961, and 87.5 percent above the 1954-1961 8-year average. It is apparent that Colorado is experiencing a year-to-year upward trend in breeding-pair numbers, possibly as a result of continuing drought conditions in the northern breeding grounds.

Comparison of individual breeding-ground estimates between 1962 and 1961 showed that the duck population in the San Luis Valley was 39.5 percent above last year and 155.0 percent above the 8-year average. In the Yampa Valley, ducks increased 71.3 percent above last year and 80.5 percent above the 8-year average. Duck populations in all other breeding grounds were slightly below those of last year, but only North Park and Brown's Park were below the 8-year average also. In the case of these two areas, the decrease is somewhat surprising

in view of the fact that water levels are higher than last year. In Brown's Park, early high water filled some of the flood plain marshes, thus improving conditions over those of 1961; but in general, this area is experiencing a severe downward trend in breeding habitat quality.

### BREEDING POPULATION INDEXES

Species composition of the breeding duck population was similar to past years. Mallards were increased and gadwalls, green-winged teals, and shovellers were decreased somewhat, with most other species holding about the same population level.

In 1962, the western slope Canada goose breeding area contained the largest number of adult geese and goslings observed since the beginning of the study in 1956. Table F-24, (p. 121) gives the numbers, age composition, locations, and past year's comparisons of this breeding flock. Brown's Park (Green River) held more geese than last year, when all marshes were completely dry, but the habitat was still not as attractive as in former years as witnessed by the 8-year percent decline from the 6-year average. If Flaming Gorge Dam begins water impoundment this fall, the days of high flood water are over in Brown's Park; and, in turn, we can write off this area as a significant Canada goose breeding ground.

The goose population on the Yampa River increased 85 percent over 1961, and 158 percent over the 1956-1961 average. No information is available for past years on the Little Snake River, since this year marked the first time this area has been surveyed.

The steady and healthy increase of this goose flock for the past several years strongly suggests that we recognize and are controlling the factors which caused the sharp population decline in the early 1950's. It further indicates that the restrictive harvest type of management for this flock employed by the Bureau of Sport Fisheries and Wildlife and individual States, up and down this Flyway, will be a necessary part of future flock management.

Specifically, three different factors appear to be responsible for this year's encouraging increase in this goose flock: (1) The protective seasons of the past, not only in Colorado but especially in the California

Game Management Unit 22; (2) excellent water supplies in the areas which attracted and held birds; and (3) early high water which forced pairs to choose nesting sites on more permanent type islands, thus preventing heavy loss due to flooding.

## CONCLUSIONS

It is anticipated that fall duck flights from Colorado in 1962 will be considerably above average, owing to the increased breeding population coupled with expected excellent water supplies through the summer.

Geese present a vastly improved status over that of previous years, but continued hunting restrictions are still very much in order. Care must be taken to avoid the original mistake of overharvesting. The recommended bag and possession limit for Moffat County for the 1962 season, therefore, is one goose.

## WYOMING

Data supplied by George F. Wrakestraw  
Wyoming Game and  
Fish Commission

## WEATHER AND HABITAT CONDITIONS

Drought conditions which had persisted throughout much of Wyoming in 1961 were finally alleviated by rains in May and June of that year. Some areas remained dry until April of 1962 when large amount of precipitation were recorded for much of the State. Snow pack at the higher elevations was far above normal. May and June of this year were months of above normal precipitation and habitat conditions were immeasurably improved over the previous 3 years. All large water impoundments were filled to

capacity, and demands by downstream water users were much less than in previous summers. At this writing it appears that all water areas will retain enough water to see all waterfowl broods reach wing.

## BREEDING POPULATION INDEXES

The estimated duck breeding pair population for 1962 shows an increase of 94.4 percent from 1961 and an increase of 20.5 percent from the 1955-1961 average.

The total number of ducks counted is computed by combining the number of breeding pairs with birds that were found in groups. It will be seen that the total number of birds counted in 1962 is 199,057 or 97.7 percent above the estimate for 1961. Furthermore, this figure represents an increase of 27.9 percent from the previous 6-year average.

In 1962 an increase of 9 percent in goose production was recorded over 1961 and an increase of 22 percent was registered over the long-term average.

The production areas of the State contributing geese to the population which migrate down the Colorado River system and winter in Arizona and southern California showed a decrease of 13 percent from 1961, but registered an increase of 25 percent from the long-term average.

## CONCLUSIONS

Water conditions are vastly improved in Wyoming over the past 3 years.

Ducks were recorded in greater numbers on existing areas and it is concluded that the fall flight of ducks from Wyoming will be very good.

Canada goose populations in Wyoming are about average and it appears that fall flights of geese from this State will be approximately the same as those of the last 2 years.

## MISSISSIPPI FLYWAY WATERFOWL KILL SURVEY

An estimated 1,701,000 ducks were bagged in the Mississippi Flyway during the 1961-62 waterfowl season, a decrease of 43 percent from the previous season (table A-7, p. 63). An additional 555,000 ducks were knocked down but not retrieved, for a total kill

(bagged plus crippled) of approximately 2,256,000 ducks.

Analysis of the total Flyway duck bag by species, as derived from data provided by the duck wing survey, places the mallard bag at 831,000 birds or 49 percent of the total

of all species. Lesser scaup (150,700), green-winged teal (139,500), wood ducks (103,500), American widgeon (97,300), ring-necked duck (78,400), pintails (77,500), and black ducks (57,800) together with mallards, accounted for almost 1,536,000 birds or 90 percent of the total Flyway bag of 1,701,000 ducks.

Estimates of changes in the bag by species, again based on findings of the duck wing survey, revealed that only lesser scaup showed any appreciable increase in bag (17 percent) from the previous season, while mottled ducks registered a slight increase of 4 percent. Nearly all other species showed sharp decreases in total bag, however, such as 76 percent in blue-winged teal, 57 percent in black ducks, 45 percent in mallards, 62 percent in ring-necked ducks, and 41 percent in pintails.

All States registered sharp decreases in total duck bag, ranging from 16 percent in Illinois to 79 percent in Arkansas (table A-8, p. 64). The average seasonal duck bag

per hunter in all instances dropped less than did total State bags, suggesting reductions in total bag to be due more to decreases in numbers of active hunters than to hunting success among the participants.

The total Flyway goose bag of an estimated 166,000 birds dropped 7 percent from the previous season. An additional 40,000 geese were knocked down but not retrieved, for a total kill (bag plus cripples) of approximately 207,000 geese.

An estimated 69,900 coots were bagged in the Flyway, a decrease of 64 percent from the previous season. An additional 33,100 coots were knocked down but not retrieved, yielding a total kill (bag plus cripples) of about 103,000 coots.

A total of approximately 450,000 waterfowl hunters were active during an estimated 2,481,000 hunter-days (table A-9, p. 65), registering decreases in these estimates of 26 and 38 percent, respectively, from the previous season.

## WING COLLECTION SURVEY

Flyway-wide age ratios of the more important species of ducks in the kill during the 1959-60, 1960-61, and 1961-62 hunting seasons are shown in table B-2 (p. 70). Mallard age ratios (table B-3, p. 71), contained fewer immatures per adult in all States of the Flyway in 1961-62 as compared with 1960-61. The weighted Flyway-wide ratio indicated that the number of immatures per adult was 39 percent lower in 1961-62. Black duck wings from the Mississippi Flyway in 1961-62 indicated higher ratios of immature to adult birds from Wisconsin and Michigan than from the States to the south, (table B-6, p. 74). The Flyway-wide age ratio for black ducks suggests an increase of approximately 14 percent in the ratio of immature to adults in the kill during the 1961-62 season.

Species composition of the kill in the Mississippi Flyway is shown in table B-5, (p. 73). Mallards decreased from 52.5 percent of the kill in 1960-61 to 48.9 percent in 1961-62. This was due chiefly to the kill of lesser scaup which increased from about 3.5 percent in 1960-61 to nearly 9 percent of the total duck kill in 1961-62. This increase was due in part to an increase in the kill of lesser scaup in Louisiana, Mississippi, and Alabama based on data from the Bureau's mail-questionnaire survey. The proportion of the kill consisting of wood ducks increased in the 1961-62 kill. This increased proportion of wood ducks in the kill was due to lesser numbers of other species, since the total wood duck kill in the Flyway was estimated to be 27 percent less than in 1960-61, according to the Bureau's mail-questionnaire survey.

## WINTER SURVEY

Data supplied by Arthur S. Hawkins,  
Flyway Representative,  
Bureau of Sport Fisheries  
and Wildlife

## FACTORS AFFECTING SURVEY

Last year's survey was completed without interruption, owing to a combination of

unusually favorable conditions. In contrast, this year's survey was marred by several adverse factors. Louisiana census takers, warned of impeding bad weather, commenced their coverage on January 4, 4 days ahead of schedule. During the survey period a strong cold front moved through the entire Flyway, bringing snow in some sectors

and severe cold throughout. This may have caused some shifting of waterfowl populations, but the end results are considered comparable with the past.

In the north central States severe winter conditions including general snow cover, except in the extreme southern part, made most of the region unattractive to wintering ducks. The weather was very uncomfortable for the census takers with below zero temperatures, strong winds, and shifting snow prevailing throughout the region during much of the survey period. These same conditions caused delays in the survey but also greatly restricted the area requiring coverage. Local flooding in Missouri and Illinois inundated some unharvested fields and created excellent feeding conditions which had attracted fairly heavy concentrations of waterfowl. Throughout most of the region, however, waterfowl were unusually scarce.

In the south portions of the Flyway sub-zero temperatures during the survey period extended as far south as northern Mississippi and Alabama. Ice and sleet invaded even the Gulf Coast marshes. In some areas the ice aided the census takers by concentrating the birds but in other areas the waterfowl were widely scattered and difficult to find due to the extensive range available to them following the early closure of the hunting season. Poor flying conditions in Tennessee and Alabama prevented completion of the survey until January 14 and 16, respectively; and in Louisiana the survey lasted from January 4 to 11. Only Arkansas reported no operational difficulties caused by weather.

Buildups of birds in some areas apparently were at the expense of reductions elsewhere. For example, a substantial increase of birds in Kentucky matched a corresponding decrease in Indiana. Tennessee and Arkansas reported marked decreases, but these were compensated for in part by increases in Alabama and Mississippi. Overall, however, the increases failed to balance the decreases. Habitat and food conditions on the wintering grounds this year were considered excellent.

## POPULATION TRENDS

Total waterfowl numbers (ducks, geese, coots, and swans combined) in this Flyway were about 1.3 million (14 percent) lower in January 1962 than at the same time in 1961.

Even so, the 12-year average was exceeded by nearly 16 percent.

Considering duck population only, the pattern was similar--down 15 percent from last year but 13 percent above the long-term average. At first glance these findings seem inconsistent with the many reports of a serious duck situation. Careful analysis, however, provides the explanation. Most of the answers can be found in one place--Louisiana.

Going back to the period 1955-58 we note that Louisiana carried a remarkably consistent part of the total Flyway duck inventory, varying within the narrow limits of 25-29 percent. In 1959 the population in Louisiana jumped to 41 percent, in 1960 to 51 percent, in 1961 to 57 percent, and in 1962 to 70 percent. This change in distribution within the Flyway apparently was caused by a combination of habitat changes and species responses, or, in the case of scaup, possibly by mere chance. The turning point was in 1957 when wet conditions returned to the coastal marshes after a severe drought. The response by some species was immediate but far less spectacular than the response following Hurricane Audrey a year later. This hurricane can be credited with renovating a major segment of the coastal marshes. The prime conditions which resulted still prevail, and a whole generation of ducks has learned it is no longer necessary to make the long trek south of the border.

This phenomenon is easily demonstrated by the inventory figures. The principal species which have been detained by these conditions are those with a winter range extending as far south as Central and South America; namely, the gadwall, baldpate, green-winged and blue-winged teal, shoveler, pintail, and coot. During the 8-year period prior to the advent of these lush conditions, the six dabbling ducks mentioned above, plus the coot, averaged about 1.2 million in the Flyway count. During the past 3 years these same species have averaged nearly 2.9 millions, or, 2.4 times their earlier numbers. This is particularly remarkable since all the data show that the past 3-year period has been one of low productivity and declining duck numbers.

Another species prominently involved in changing the proportion of ducks found in Louisiana is the scaup. During the 8-year period 1950-57, the average number of

scaup listed on the inventory was 193,100. Compare this with the average of 1,430,400 for the last 3 years. Certainly scaup populations of today are not 7.4 times greater than they were in the midfifties when most waterfowl populations were at relatively high levels. In this case the answer may be one of chance (finding the birds inshore at the time of the survey), improved coverage, or possibly some change in habitat conditions. Whatever the reason, the Mississippi Flyway counts of recent years have been greatly enlarged by factors other than generally increasing duck populations.

A glance at the mallard figures quickly dispels any false sense of optimism generated by the buildup in Louisiana. Despite a drastic curtailment in the hunting regulations last fall, the mallard population continued to decline. For the first time in a decade the total count for the entire Flyway failed to reach 2 million. Some years the count is relatively low because major concentrations have remained in the northern part of the Central Flyway. This year such is not the case. From 1953-57 two-thirds or more of the ducks recorded during the inventory were mallards, until this year less than a third of the ducks recorded were this species and this trend is illustrated in the following yearly comparison:

| <u>Year</u> | <u>Percent</u> | <u>Year</u> | <u>Percent</u> |
|-------------|----------------|-------------|----------------|
| 1953        | 67             | 1958        | 60             |
| 1954        | 70             | 1959        | 57             |
| 1955        | 68             | 1960        | 45             |
| 1956        | 72             | 1961        | 41             |
| 1957        | 70             | 1962        | 30             |

This loss in dominance is not entirely the result of a decline in abundance. In part it is due to the increase in the short-stopped species mentioned earlier, and particularly of the scaup which this year (with 26 percent of the total) was almost as abundant as the mallard. For the 10-year period 1950-59 scaup composed only 3.6 percent of the total.

The ring-necked duck, which is a species largely independent of the drought-striken prairies, was one of the few ducks showing a substantial gain this year. The black duck, which also nests outside the prairies, dropped markedly in numbers. A study of the kill data when they become available may reveal the reason for this apparent

inconsistency. Canvasback numbers were slightly larger than a year ago but still 46 percent below long-term averages. Wood ducks are extremely difficult to inventory, and the sharp decline on paper may or may not have any significance. Mottled ducks showed a substantial increase, also a reflection of the favorable habitat conditions in Louisiana.

Goose numbers dropped from those of the previous year, but populations still are at near normal levels. Coots, as already mentioned, gained in this Flyway largely, we believe, because of the attractive habitat offered. Swans, never abundant here, were somewhat scarcer than usual.

The latest survey demonstrated, as have others in the past, that the distribution of waterfowl is greatly influenced by habitat and weather conditions. Consequently, it is risky to draw conclusions from the vantage point of a single Flyway or parts thereof. However, there seems sufficient reason to focus attention on the mallard situation.

We know from experience that the Missouri River in South Dakota sometimes stops a large part of the mallard population which otherwise would have continued into the Mississippi Flyway. The segment in South Dakota has varied since 1957 from a low of 75,000 to a high of 1,326,000. Including it with the Mississippi Flyway inventory, total mallard numbers since 1957 have been as follows:

| <u>Year</u> | <u>Mallards</u> |
|-------------|-----------------|
| 1957        | 5,605,000       |
| 1958        | 5,345,000       |
| 1959        | 4,500,000       |
| 1960        | 3,100,000       |
| 1961        | 3,600,000       |
| 1962        | 2,100,000       |

Except in 1961, when a slight recovery occurred, the trend has been entirely in one direction--downward. Last year's added restrictions in hunting regulations were designed to stop this trend but failed to do so, perhaps because too many hunters selected mallards in preference to other species. The resulting problem is obvious: How can this downward trend be stopped without sacrificing any more recreational opportunities than is necessary to safeguard these birds for the future?

For more information regarding the winter survey in the Mississippi Flyway, refer to tables in appendix C.

## BREEDING GROUND SURVEY

### NORTHERN SASKATCHEWAN

### NORTHERN MANITOBA WESTERN ONTARIO

Data supplied by Arthur R. Brazda  
and Rossalius C. Hanson,  
Bureau of Sport  
Fisheries and Wildlife

### WEATHER AND HABITAT CONDITIONS

Ice was slow in going out of all the lakes this spring. Breakup was about 10 days late, and foliage appeared to be retarded just as much. However, when spring finally came it opened up every quickly. We started out on May 23 with the most southern transect in Saskatchewan, number 1. Lake Waskesiu, which this transect covers, had ice on it until May 20. We expected to be too early to run the transects on May 23, but indications were different. With paired birds and single drakes in evidence and all the water areas open, we continued the survey. We certainly did not encounter flocks of birds waiting below the ice line. Aspen foliage was about one-fourth leafed and varied in areas as we continued.

When we came to The Pas on the same day (May 23), the big lakes were icebound or partially so, but the Saskatchewan River Delta and all the marshes west and east of The Pas were open. On May 25 we found Lake Winnipegosis with ice partially out and most of the big lakes east of the Saskatchewan River Delta almost entirely open except Lake Winnipeg. The northern end of the lake was frozen solid whereas the middle and southern parts were open. On May 27 we found a small segment of ice still in the northwest corner of Lake Nipigon. On May 28 we flew a section of the most northern line in Ontario and found Big Trout Lake still frozen. Except for the lakes mentioned, all water areas were wide open and birds were well scattered in singles, pairs, or small groups. Mallard drakes were already in groups of two to five. From May 28 on, no more ice was seen until June 11 when we flew over the south end of Reindeer Lake in Saskatchewan. The middle and northern

parts were solid ice but the southern part was open.

Aspen foliage varied as to development depending on the area and date. Over most of the more northern and eastern areas the aspens were barely leafed out, whereas aspens in the western and southern areas were completely leafed. Showers and thunderstorms were frequent during the survey period as mentioned previously. Water conditions were above normal in all the areas east and north of Winnipeg and north of Flin Flon. The Saskatchewan River Delta was still below normal level. In general, water levels in the area north and west of Prince Albert to Fort McMurray appeared slightly below normal.

We noted evidence of the past drought in many huge, recently burned-over forest areas. These appeared to be recent fires of the past 2 or 3 years. No forest fires were noted. Visibility was excellent with clean, clear air. I can't be sure that certain weather conditions were unusual for this time of year, but we did run into a spring snow after a period of wet weather ending June 1. On that date we found a spring snowfall of 1 to 2 inches starting at Pickle Lake, Ontario, and extending as far north as we flew (about 54° N.). By late afternoon this snowfall had disappeared. Other than the heavy rains no unusual conditions were noted. To what degree nest flooding took place after these rains is not known, but it is likely that the heavy rains could have had an adverse effect.

With the exception of the Saskatchewan River Delta marshes near The Pas, Manitoba, habitat conditions appeared to be good to excellent. Water levels in The Pas area were observed to be only fair during the May survey, and this downward trend continued throughout the summer. Qualified personnel related that there had been little rainfall, and this was supported by the large number of forest fires recorded in the area. A few of these fires had been burning for as long as 2 weeks and had consumed a considerable acreage at the termination of the survey.

### BREEDING POPULATION INDEXES

Summary of the survey populations is found in tables E-23 and E-24, (p. 106

and 107). The overall survey area showed a 26 percent increase in duck populations this year compared with 1961. The increases varied from only a fractional gain in Manitoba to increases of 61 percent in Ontario and 78 percent in the more northern areas of Saskatchewan. In the Saskatchewan River Delta area, a decrease of 20 percent was noted. This was the only area showing a decrease. Coots showed a major decline of 80 percent, mainly in the Saskatchewan River Delta. However, coots were practically nonexistent in all other areas as has been the general pattern in past surveys. Canada goose populations were down 8 percent. Total duck population index in 1962 was 1,159,963 compared with 921,301 in 1961.

If the spring weather conditions, previously mentioned, had no harmful effects on duck production, the outlook for the fall flight from this area should show a slight increase. The thought that many prairie nesters have moved, or did move this year, into the well-watered or permanent water areas, does not seem to be true. However, numbers of dabbling ducks, particularly mallards, were generally increased throughout the area but not enough to suggest a major displacement. Several diving species showed some substantial increases whereas others remained the same or decreased. Of the diving species, the ring-necked duck showed a very large increase.

## PRODUCTION INDEXES

July survey data are shown in tables F-25 and F-26 (p. 121 and 122). It will be noted that the total duckling index has continued the upward trend which began in 1959. The number recorded was 164,781 in 1959; the 1962 total was 393,608, or an increase of 106 percent. The late-nesting index gravitated upward tremendously from 1961 to 1962 and appears to be out of all proportions. No attempt will be made to analyze this trend; however, it should be stated again that the scanning radius was one-sixteenth of a mile in 1962 as compared with one-eighth of a mile in previous years which results in a larger expansion factor. In addition, survey crews were changed in 1962.

Comparison of the brood classification data indicates that first nesting attempts were moderately successful but not as

successful as in 1961. The high percentage of class II broods (62 percent) bears out this statement.

## CONCLUSIONS

Both breeding pairs of ducks and duck production increased over 1961 and, therefore, a substantial increase is expected in the fall flight from this area.

## SOUTHERN MANITOBA

Data supplied by J. Donald Smith  
and Maruice H. Lundy,  
Bureau of Sport  
Fisheries and Wildlife

## WEATHER AND HABITAT CONDITIONS

After the rather severe winter of 1961-1962, which seemed to remain for a discouragingly long period (March and April), it was thought the 1962 spring migration and growth of vegetation would be later than usual. Such was not the case, however, for the blue-winged teal arrived about on time as did most the other species of waterfowl. The warm weather which enveloped the prairies for a short period in the last few days of April and the first week in May brought the aspen leaf development along very fast. By May 15 the aspens and willows were fully developed and produced definite visibility problems for the aerial crew. Pond vegetation also developed very quickly this year to add to visibility difficulties during the latter part of the survey period.

The survey began on May 8 and concluded on May 21. The weather during the survey period was characterized throughout by rain and low overcast sky which prevailed generally until midday giving way to low broken clouds with moderate easterly winds. These conditions made it impossible to confine the aerial work to the morning periods and as a consequence the majority of the survey was conducted during the late morning and afternoon hours.

Weather conditions were the result of a series of maritime low-pressure systems which moved from the southwest to the

northeast, bringing much moisture and unsettled weather. These systems appeared to enter the Province of Manitoba along the western edge of Turtle Mountains and proceeded to lose large amounts of precipitation in a northeasterly pattern across the Province leaving western Manitoba dry but inundating the central eastern parts.

The ponds and marshes in central and eastern Manitoba appeared to be fairly well supplied with water. The western part of Manitoba waterfowl habitat was decidedly droughty. Many depressions which contained water were only a few inches deep. The pond count indicates only a very slight improvement over 1961 for Manitoba water in 1962 (table D-7, p. 91). It is rather interesting to note that the 1962 pond count is 68 percent below the high water year in Manitoba (1954). Owing to burning, haying, and cultivation of Manitoba ponds during the dry spell of last summer and fall, over-water nesting cover was very scarce this spring. This lack of cover may have had a serious effect on the production of canvasback and certain other diving ducks in Manitoba this season. There were a few large marshes such as Glenora and Pope which escaped match and plow and which had an abundance of water, emergent vegetation, and waterfowl this spring. Unfortunately, these larger marshes were not numerous.

## BREEDING POPULATION INDEXES

The May breeding populations are illustrated in table E-25 (p. 108) for the past 12 years. Calculations this year were made as in the past to arrive at the 1962 index. No flocks of pintails or mallards judged to be non-nesters were observed this year as in the past 4 years. In fact, the few flocks which were counted may include birds which will nest later in Manitoba.

It is immediately apparent from an examination of the survey data that the breeding population index for Southern Manitoba is the lowest attained in the past 12 years, being 39 percent lower than 1961 and 16 percent lower than the previous low year of 1953. (table E-26, p. 108). When flocked ducks are included, however, the 1961 index becomes 36.7 percent lower than in 1961.

All species except redheads and pintails dropped sharply from 1961. Particularly

disappointing was the reduction of mallards and blue-winged teal. Coots were nowhere abundant and suffered a reduction of 58 percent from the 1961 index.

The ratio of lone drakes to pairs this year was found to be 62 percent which apparently is the lowest ratio on record. This may indicate a late season with consequent late hatching dates.

## PRODUCTION INDEXES

While the water conditions in southern Manitoba showed a definite recovery from last year, the waterfowl population continued its downward plunge. Coot production made a slight gain in contrast to the duck production which now is at the lowest point since the surveys began in 1954. Here again is illustrated the remarkable and immediate reaction of coots to water conditions. Coots increased 17.2 percent over last year, while the duck broods decreased 56.3 percent from 1961.

The index to late nesting composed of single drakes, hens, and pairs is down 38.4 percent from last year with sharp reductions in pintails, baldpates, scaup, and redheads which were not offset by moderate increases in gadwalls, blue-winged teal, and ruddy ducks. It would appear that there were a moderate number of blue-winged teal and ruddy duck broods yet to arrive (table F-28, p. 123).

Although some large groups of ducks of mixed sexes were observed this year on the larger marshes, it is not believed that the number of these birds was unusually large or indicative of any abnormal behavior.

The distribution of broods by age classes as found this year indicates that the hatching peaks were somewhat later this year than last but not as late as in 1958, 1959, and 1960.

Fifty-seven class II and III broods were observed closely enough to permit counting individual birds of the brood. The average brood size was 5.3, almost the lowest figure obtained in the past 9 years of the survey. Only in 1956 was the brood size lower. This probably is indicative of rather high loss of first nesting attempts (table F-29, p. 123).

Owing to the shallow nature of the majority of the Manitoba ponds this year and perhaps to their gentle recovery from the parched condition of last year, a heavy

growth of vegetation developed in many of the ponds. This made it very difficult to detect broods and in many cases to determine whether basins were wet or dry. In contrast to last year it may be true that such broods as were present were considerably less visible than is normally the case. It is quite probable that the broods recorded this July represent a somewhat lower than normal average percentage of the population present.

## CONCLUSIONS

On the basis of significant reduction in breeding pairs and duck broods, and the late-nesting index, the fall flight from this area is expected to be substantially reduced from 1961 and will be the lowest flight since the beginning of these surveys.

## MICHIGAN

Data supplied by Merrill L. Petoskey,  
Michigan Department of  
Conservation

## WEATHER AND HABITAT CONDITIONS

The winter was severe with more than the average amount of snow throughout most of the State. Temperatures ranged slightly below normal with record low temperatures during the week of March 5. Spring breakup was about 2 weeks later than usual. Since then, temperatures have been normal or slightly above and precipitation very light throughout most of the State. Lake levels were generally below the 15-year median with some June levels in the south approaching the lowest on record. Ground water levels are below average but still remain higher than a year ago. The only exception to the low levels is in the Thumb area. Here the levels rose sharply to a near record high because of heavy precipitation.

The weather during April, May, and June has contributed to a good breeding season with warm temperatures and little precipitation.

## BREEDING POPULATION INDEXES

The potential breeding population of 1962 was the highest observed in the last 11 years (table E-27, p. 109).

Counts of potential breeding wood ducks were made during regular census trips. No special observations are made on the wood duck. All observations are made in conjunction with those on other species. Most of the areas censused do not contain very much of what is considered to be ideal wood duck habitat.

The number of breeding wood ducks per lineal mile of census route was the highest ever recorded. Wood ducks made up 8.9 percent of the local nesting species, considerably higher than last year.

Check of use of nest boxes by wood ducks was discontinued 2 years ago; data gathered was considered unreliable.

## PRODUCTION INDEXES

Number of broods observed per lineal mile was the highest on record (table F-30, p. 124). The number of lone drakes observed was slightly higher than last year but well below the high of 1960. The number of hens and young seen per lineal mile was the highest on record. From these observations we feel that a high percentage of the nesting birds were successful.

## CONCLUSIONS

Our breeding population and production data indicates that a record number of breeders were on hand. The only serious difference from last year was a reduction in the number of black ducks seen. Good weather during the incubation and hatching period coupled with subsequent data from the brood counts leads us to believe that 1962 will be the best production year in the past 14 years in Michigan.

## IOWA

Data supplied by James G. Sieh,  
Iowa State Conservation  
Department

## WEATHER AND HABITAT CONDITIONS

Heavy runoff from deep snow cover, approximating 6 feet on the level during the late winter of 1962, filled sloughs, marshes, and potholes to overflowing during the

prenesting period. As a consequence, nesting sites selected by groundnesting species were not exposed to flooding in most cases. Cover conditions in the upland and dry edge, as well as in the marshes proper, were excellent. Emergent aquatic growths in the water remained dense, and additional inundated marsh edge provided more habitat for nesting diving species. These optimum nesting conditions have followed the dry years of the late fifties and practically insure near optimum waterfowl nesting and rearing conditions. Locally severe rains have in a few cases temporarily raised water levels causing some loss to birds still incubating or renesting in vulnerable spots. In that these rains came after the hatching peak for most species, these losses are considered of minor importance. Habitat conditions were slightly improved in quantity over 1961, but in a few cases the quality of emergent growths has declined.

### BREEDING POPULATION INDEXES

Observations indicated that the nesting numbers and densities of blue-winged teals were as high or higher in 1962 in State-owned marshes than in any year since 1949. Wood duck breeding pairs appear to be about the same as in 1961, but well above the reduced numbers present in northern Iowa during the recent drought years. The number of mallards nesting in northern Iowa appears to be about the same as in 1960, but far below the nesting densities of the early fifties when habitat conditions were somewhat similar owing to high water. Mallard populations represent the only nesting species which show a decided and noticeable decline even under much improved habitat conditions. Redheads and ruddy ducks are again abundant for Iowa, and they are present in about equal numbers compared with 1961. Additional inundated areas with increased nesting edge due to abnormally high water indicate a slight increase in desirable habitat for these diving species. Nesting pintails are present in larger numbers than usual, but their numbers are so few that total production is of little consequence. This is equally true for other miscellaneous species such as the gadwalls, shovanders, etc. Nesting coot populations remain high, but slightly below the peak numbers present in 1961.

### PRODUCTION INDEXES

Brood counts and drive trapping results indicate excellent production and survival of blue-winged teals, wood ducks, pintails, redheads, and ruddy ducks. Mallard production appears far below average, but brood densities are so low that productivity is difficult to evaluate. Coot production is down slightly, but overall production is still very high for Iowa.

### CONCLUSIONS

The fall flight of ducks from Iowa will be about the same as in 1961, and, except for mallards, well above the 10-year average.

### INDIANA

Data supplied by David M. Brooks,  
Indiana Department of  
Conservation

### PRODUCTION INDEXES

The nine stream sections (Maumee, Elkhart, Big Flue, Iroquois, Mississinewa, West Fork of the White, Eel, and Muscatatuck Rivers, and Salt Creek) were censused by use of an outboard-motor-powered boat. A total of 129 wood duck broods were observed on these streams, the greatest number ever recorded. This represents an increase of 17.3 percent over 1961 when 110 broods were recorded; a 26.2 percent over the 5-year average of 102.2 made from 1957 to 1961, and 40.8 percent greater than the previous 10-year average of 91.6. (table F-31, p 124).

A total of 983 young wood ducks were observed in the 129 broods. Of these, a complete count of young was believed to have been made on 99 broods totaling 896 young, an average of 9.1 young per brood. This compares favorably with those of past several years.

The number of broods per 100 miles in 1962 reached an all-time high of 90.2. The computed number of young per 100 miles, is also an all-time high of 821.

### CONCLUSIONS

The fall flight of wood ducks from Indiana is expected to be substantially greater than in 1961.

## MISSOURI

Data supplied by Missouri  
Conservation Commission

### WEATHER AND HABITAT CONDITIONS

Precipitation during the fall of 1961 and spring of 1962 was above normal over much of the State of Missouri. Flood conditions during the fall of 1961 greatly improved spring waterfowl nesting habitat by inundating bottomland marshes, sloughs, oxbows, and cutoffs.

The arrival of spring was retarded by 1 to 2 weeks as temperatures through March and April remained unusually cold. Temperatures remained below normal until May, when they jumped 8° to 10° above normal.

Little precipitation was received during April, May, and June. Waterfowl nesting conditions throughout the production period were considered excellent.

### PRODUCTION INDEXES

Wood duck nesting efforts per square mile of marsh and lake habitat increased only slightly over 1961 (2.9 to 3.2). Nesting efforts on 470 miles of stream increased by 18 percent. The nesting effort per mile of stream was the highest ever recorded in the State.

The number of broods sighted per mile of stream has steadily increased over the

past 3 years. The 0.14 broods recorded per mile of stream in 1962 is a 10-year high. Average brood size was 8.1 young ducks. This is an increase of 2.3 young ducklings per brood over 1961.

Many stream observers were in agreement that wood duck production improved significantly over last year, and was probably the best in 10 years.

Mallard nesting efforts decreased on lake and marsh habitat, but sample sizes are too small to be significant. Observers reported 34 nesting efforts in 1961 compared with 12 in 1962.

Mallard production on streams improved considerably over last year. Only 0.04 nesting efforts per mile of stream were recorded in 1961 while this year's data shows 0.11. If these data are valid indicators of production, a significant population of mallards will be produced in Missouri. This was by far the best mallard production ever recorded in the State.

No observations were recorded on nesting blue-winged teals. Only three broods were sighted on streams. Although this species once nested in Missouri in significant numbers, a brood sighting today is a rarity.

Results of the 1962 survey are presented in table F-32, (p. 124).

### CONCLUSIONS

There will be a substantial increase in the fall flight of wood ducks from the State of Missouri this year compared with 1961.

## ATLANTIC FLYWAY

### WATERFOWL KILL SURVEY

An estimated 676,000 ducks were bagged in the Atlantic Flyway during the 1961-62 waterfowl season, a decrease of 16 percent from the previous season (table A-10, p. 66). An additional 208,000 ducks were knocked down but not retrieved, yielding a total kill (bag plus cripples) of approximately 884,000 ducks, a decrease of 19 percent from the previous season.

Analysis of the total duck bag by species, as derived from data provided by the duck wing survey, shows that the bags of five species, black ducks (183,100), wood ducks (115,300), mallards (98,800), green-winged

teal (46,400), and ring-necked ducks (45,500), comprised over 489,000 ducks or 72 percent of the Flyway bag of all species.

Only three species of ducks registered bag increases from the previous season, according to information provided by the duck wing survey (table B-2, p. 70). Lesser scaup registered a fantastic 183 percent increase; however, the species comprised only 4 percent of the total Flyway duck bag. The bag of wood ducks increased an estimated 17 percent, and that of Florida ducks increased 25 percent. Bags of all other species showed definite decreases

except ring-necked ducks which remained relatively stable with an estimated 4 percent increase. Bags of black ducks, green-winged teal, and mallards dropped 27, 29, and 15 percent, to cite three important examples.

At the State level only three States registered increases in total bags of ducks: Vermont (55 percent), New Hampshire (11 percent), and Florida (7 percent) (table A-11, p. 67). Otherwise, decreases ranged from 3 percent in Pennsylvania to 44 percent in both Delaware and Virginia.

The total Flyway goose bag of an estimated 80,300 birds dropped 17 percent from the previous season. An additional 17,200

geese were knocked down but not retrieved, for a total kill (bag plus cripples) of approximately 97,500 geese.

An estimated 25,800 coots were bagged in the Flyway, suggesting a slight decrease (3 percent) from the previous season. An additional 13,400 coots were knocked down but not retrieved, for a total kill (bag plus cripples) of about 39,000 coots.

An estimated total of 169,300 waterfowl hunters were active during more than 1,005,000 hunter-days, registering decreases, in these estimates, of 12 and 10 percent, respectively, from the previous season (table A-12, p. 68).

## WING COLLECTION SURVEY

Flyway-wide age ratios of the more important species of ducks in the kill during the 1960-61 and 1961-62 hunting seasons in the Atlantic Flyway are listed in table B-2 (p. 70). Nearly all species showed a decrease in the ratio of immature to adult birds during the 1961-62 hunting season.

Mallard age ratios from most States of the Atlantic Flyway contained fewer immatures per adult in 1961-62 than in 1960-61. A small collection of mallard wings made near Georgetown, South Carolina, (table B-4, p. 72), also suggested a decline in the number of immatures per adult in the kill. The weighted Flyway-wide age ratio contained 21 percent fewer immatures per adult than in 1960-61.

Black duck age ratios in each State in the Flyway for both 1960-61 and 1961-62 seasons are presented in table B-6, (p. 74). The New England States, New York, and

Pennsylvania reflected sharp decreases in the ratios of immature to adult black ducks in the 1961-62 kill. The weighted Flyway-wide age ratio indicated a decline of 17 percent in the number of immatures per adult in 1961-62 when compared with the previous year.

Species composition in the Atlantic Flyway in 1961-62 was similar to that of the previous year with a few minor exceptions (table B-5, p. 73). The proportion of the Flyway kill made up of black ducks decreased from 30.5 to 27.0 percent of the total from 1960-61 to 1961-62; wood ducks increased from 12.5 to 17.1 percent; and lesser scaup increased from 1 percent in 1960-61 to 4 percent in 1961-62. According to the Bureau's mail-questionnaire survey, the estimated kill of both wood ducks and lesser scaup increased while the kill of most other ducks decreased as compared with the previous season.

## WINTER SURVEY

Data supplied by C. E. Addy,  
Flyway Representative, Bureau of  
Sport Fisheries and Wildlife

## FACTORS AFFECTING SURVEY

The coverage this year was considered excellent and comparable with that of last year. Generally, conditions were reported good for the survey. In the middle and

southern part of the Flyway, the first 2 days were good, but on the third day, the survey was momentarily interrupted by a cold front which moved across accompanied by rain, snow, ice, and low temperatures. In the northern part of the Flyway, fresh waters were frozen, but tidal areas along the coast were largely open, with the birds more scattered than they were last year. Dry conditions were reported for Florida and Georgia, but flooding conditions were

reported in some areas from South Carolina north, where birds were scattered in flooded timberlands of many rivers. The survey was carried out during the period January 8-14.

## POPULATION TRENDS

On a comparable-coverage basis, dabbling ducks showed a slight decrease (-12 percent) from last year and game diving ducks (excluding scoters, eiders, oldsquaw, and mergansers) no change (-2 percent). Both these groups are still well below the average level of the previous 10 years. All ducks collectively are down approximately 25 percent from the long-term average.

Of the dabbling duck species, the important black duck unfortunately was not recorded as having improved its population level much over the low figure of last year. Decreases were tallied for the mallard (-35 percent) and the pintail and green-winged teal (-18 percent). The widgeon shows a small increase over last year. More Florida or mottled ducks were recorded this year than last. From the long-term basis, all important dabbling duck species are still well below the average level of the previous 10 years.

The much sought for canvasback continued its decline with a -13 percent change from last year. The redhead showed a slight increase, the scaup showed no change, and the important ring-necked duck continued to exhibit a sizeable, drop in numbers (-20 percent). The number of ring-necked ducks recorded this year in the Atlantic Flyway is less than a third of the number recorded during the early fifties. The sizable increase recorded for the ruddy duck might be

attributed in part to better visibility at the time of the survey. Like the dabbling ducks, all important diving species are still well below the average level of the previous 10 years.

The coot and possibly some of the diving duck species, notably the scaup, are believed to be inconsistent in their distribution from one year to the next, so that in some instances a better measure of the population might be obtained by combining the Atlantic and Mississippi Flyway estimates.<sup>2</sup> Although the coot showed a drastic decline from the average in the Atlantic Flyway (-57 percent), the combined figure for the two Flyways indicates no change. Likewise, more satisfactory levels are indicated for the scaup and the ring-necked duck. However, evaluation of these figures must be tempered by the knowledge that habitat conditions in the lower end of the Mississippi Flyway are at present so good that birds are attracted from a wide area, including birds that may normally winter south of the Flyway.

Some far-north nesters apparently had close to a total failure this year in production. The brant showed a loss of about 50 percent, the snow goose, -26 percent and the swans -37 percent. Even the Canada goose exhibited a significant decrease (-23 percent). Last year (1961) most of the far-north nesters had good production.

For additional information concerning the Atlantic Flyway winter survey, refer to appendix C.

<sup>2</sup> Included in the Atlantic Flyway are the States plus the Provinces of Quebec, New Brunswick, Nova Scotia, Prince Edward Island, and Newfoundland. Included in the Mississippi Flyway are the States and the Provinces of Ontario and Manitoba.

## BREEDING GROUND SURVEY

### MARITIME PROVINCES

Data supplied by C. O. Bartlett,  
Canadian Wildlife Service

### WEATHER AND HABITAT CONDITIONS

In contrast with 1961 there was no unusual accumulation of snowfall in the Maritimes during the first quarter of 1962, and spring runoff in most areas was about

normal. Exceptionally heavy rainfalls occurred in eastern New Brunswick, northern Nova Scotia, and Prince Edward Island during early April, and flood conditions prevailed in some areas. A large number of farm ponds on Prince Edward Island were washed out as a result of heavy rainfall on March 31 and April 1. However, precipitation in May is considerably below normal, and water levels at this writing are about normal and considerably below last year's levels.

Mean temperatures for March and April have been at, or close to, normal. However, temperatures in May have been below normal; heavy frosts were recorded in parts of the Maritimes on May 24.

## BREEDING POPULATION INDEXES

Information on the status of breeding populations in Nova Scotia and Prince Edward Island is given in table E-28 (p. 98). The following trends are suggested by the available data: Black duck, no change; blue-winged teal, increase; ring-necked duck, increase; and total game ducks, increase.

## CONCLUSIONS

Weather and water conditions have thus far been favorable for waterfowl breeding in the Maritimes during the spring of 1962.

No change in breeding status is suggested for the black duck; an increase of 18 percent from the 1961 level is suggested for total game ducks.

## MAINE

Data supplied by Howard L. Mendall,  
Maine Cooperative Wildlife  
Research Unit

## WEATHER AND HABITAT CONDITIONS

Unusually mild weather in late March and the first half of April resulted in early ice clearing on waterways throughout central and eastern Maine. This was followed by 3 weeks of cold, wet weather. Plant phenology was at first advanced from average, then retarded. The latter trend has continued throughout the remainder of the spring and summer. A long, dry period, with below average temperatures, prevailed from the second week of May until the last week of June. Thereafter, precipitation has been above normal but with a continuation of unseasonably low temperatures.

The seasonal chronology had an appreciable effect, mostly beneficial, on waterfowl. Early migration of black ducks, goldeneyes, and wood ducks was heavy and rapid, followed by an occasional late arrival of

waterfowl over an extended period. First arrivals of teals and ring-necked ducks were earlier than usual, but migration peaks were slightly behind their average schedule. Nesting chronology of the early breeding species was in two distinct peaks, showing a direct effect of the extremes in the weather pattern. The prolonged drought (by northeastern standards) resulted in unusually stable water levels and permitted very high nesting success for the black duck.

## BREEDING POPULATION INDEXES;

Initial breeding populations are determined from 13 study areas that, over a period of years, have proven quite reliable indicators for northern, eastern, and central Maine, especially for the two most numerous species--the black duck and the ring-necked duck. Data for other species have less value. Blue-winged and green-winged teals and goldeneyes ordinarily do not occur on the study areas in sufficient numbers to permit more than a general estimate of annual trends.

The overall breeding population was noticeably improved over that of 1961, although there were several important species variations. The black duck showed a 17 percent increase. This is the largest annual change recorded since 1948. For the past 10 years the species has exhibited a nearly static level with only minor year to year changes. Since population estimates were based on nearly 150 pairs of black ducks, this year's figure is considered significant. This seems especially true since the increase, although most noticeable on the eastern Maine study areas, occurred in northern and central Maine as well. Breeding black ducks are at their highest level in more than two decades, even exceeding the figure for 1953. Although this is based only on measurements from individual study areas, it is supported by the concensus of biologists and wardens throughout Maine.

An interesting situation is seen in the blue-winged teal. This is a secondary species in Maine, but 1962 marked the second consecutive year when a substantial increase was apparent. Although black ducks and ring-necked ducks predominate on the Unit study areas, blue-winged teal closely followed wood ducks in numbers of breeding ducks. For Maine as a whole, it is probable

that the species was more numerous as a breeder this year than at any time since ornithological records have been kept.

Wood ducks and green-winged teal also appeared to be increased at the start of the nesting season. The goldeneye did not show an appreciable change from 1961 although the study areas are not located in optimum habitat of that species.

In striking contrast to the favorable status of most ducks, the ring-necked duck showed a 34 percent decrease. This is the largest annual change yet recorded for the species. It is now at its lowest population level on the study areas since 1947.

## PRODUCTION INDEXES

A total of 35 nests was available to supplement more voluminous, but indirect, data relative to nesting success. This is a smaller sample than usual, owing primarily to the decreased population of ring-necked ducks. These nests were divided as follows: Ring-necked duck, 18; black duck, 15; blue-winged teal, 1; and green-winged teal, 1. As of July 25, all but two of these had been rechecked with a combined hatching success of 67 percent. The figure was 53 percent for the ring-necked duck, which is much below the long-term average. For the black duck a record high of 79 percent success was noted. Although these data are based on a small sample, they are substantiated by brood studies which showed similar trends when considering breeding-pair brood ratios. On three study areas, for example, 30 pairs of black ducks had produced a minimum of 24 brood up to mid-July.

All known nests losses were attributed to predation or desertion. The mink, crow, and raven were predators most often identified as causing losses. For the first time in many years, there was no evidence of nest loss by flood. Contrary to conditions in many waterfowl breeding areas, a dry spring in the northeast is associated with high nesting success.

Major hatching periods for both black ducks and ring-necked ducks have been at near average dates when considered for the entire season. However, in both species there were two distinct peaks, one earlier and one slightly later than usual. This is in accord with the contrasting seasonal

chronology as already described. The blue-winged teal showed only one peak, occurring about a week earlier than average.

A noteworthy point is that the initial hatching peak of the black duck was very compact (during the last 10 days of May) and was more extensive than usual. This would give further support to the belief that the species enjoyed much better than average early season production. In fact, all species except the ring-necked duck evidently had a very high proportion of successful early nests. Many young black ducks and teal are already at the flying stage.

Rearing conditions have not been quite as satisfactory as a year ago. Plant phenology has been retarded. This resulted in thinner cover on some study areas and, in connection with below average temperatures, may have had an adverse effect on the abundance of insect food available to the ducklings. It may have been only coincidence, but more than the usual number of young black ducks were observed feeding on land. Water levels had dropped below optimum on many marshes by mid-June. However, extensive rainfall occurred in late June and throughout the first 3 weeks of July. At present, rearing conditions are very good and, with a replenished water table, are expected to remain satisfactory for the balance of the season.

A total of 89 broods were complete counts were made were tabulated by age classes. Average size of class I young (downy stage) is slightly higher than the 7.5 figure of 1961. The size of class III broods (two-thirds grown to flying age) is slightly lower than a year ago (6.5 in 1961 for all species combined). Although the sample for this age group is low, it may reflect slightly less favorable rearing conditions of early summer. In 1961 a minimum of successful breeders reared large sized broods. Since water levels at present are the best of the summer, it is expected that the ultimate seasonal averages for class III will show only a slight decrease from a year ago. Furthermore, the present figure for the black duck is still higher than the long-term average.

## CONCLUSIONS

On the basis of all available data, overall waterfowl production in northern, eastern,

and central Maine is very substantially increased over that of 1961. The sole exception is the ring-necked duck. A combination of a serious population decline and lower than average nesting success is occasion for concern for this species. For other ducks, and especially the important black duck, excellent production is indicated. In view of the pessimistic report on conditions in Maine a year ago, it is gratifying to record such a marked change in 1962, and a substantial improvement is expected this year in the fall flight of ducks from Maine compared with 1961.

## VERMONT

Data supplied by Robert W. Fuller  
Vermont Fish and Game Service

### WEATHER AND HABITAT CONDITIONS

Vermont experienced a late, rather cold and dry spring. Average temperatures during April, May, and June were below normal--minimums of 32° or below were recorded in the Champlain Valley<sup>3</sup> on 21 days in April and 4 days in May, the latest being 27° on May 11. Precipitation was below normal during these 3 months, also, with May and June being particularly dry.

Water levels were considered normal or only slightly below normal in most marshes during the early part of the nesting season. Had it not been for runoff from late snow accumulations in the mountains, those marshes affected by the level of streams and of Lake Champlain would have been considerably below normal as a result of deficient rainfall. Even so, Lake Champlain did not rise to usual spring high water marks, and levels were dropping significantly throughout June. Runoff was gradual because of the prevailing low temperatures, and flooding was uncommon; consequently, nest losses from this cause should have been quite rare.

Slowly rising water temperatures similarly prevailed, with the effect of delayed plant growth. Generally, the advance of aquatics and marsh vegetation was considered chronologically times to 1961 stages

(also a late spring). Marshes with no provision for water level management became lush with vegetation amplified by the transpiration processes.

### BREEDING POPULATION INDEXES

Counts of breeding pairs and territorial males were continued in 1962 along census routes of the Dead Creek Management Area in the central Champlain Valley. These disclosed substantial increases over 1961 for three of the four major species of breeding ducks, only the black duck showing a slight decrease. Unusual flocking of black ducks (thought to be predominantly drakes) with lesser number of drake mallards and wood ducks were noted from June 1 to 15; some of these birds had undoubtedly abandoned incubating females, but conjecture was also raised on two other possibilities--that of excess males in the 1962 breeding population, and that of an influx of post breeding drakes from adjacent marshes adversely affected by the dry spring and falling water levels.

### PRODUCTION INDEXES

A moderate decrease in black duck production over that in 1961 was indicated by 1962 brood counts at Dead Creek. Mallards and blue-winged teal showed pronounced increases, while the wood duck showed no change to slight increase. All species exhibited an increase in average size of broods, in conjunction with a noticeable uniformity of age classes between individual broods. The four major breeding species collectively showed a production increase of 23 percent over that of 1961 on the same area.

### CONCLUSIONS

Substantiating data on breeding populations and production from managed or unmanaged areas in the Champlain Valley other than the Dead Creek Management Area (2,500 acres) are lacking; however, field notes of observations would indicate that the slight decrease in breeding black ducks recorded at Dead Creek to be general and widespread through the area. Similarly, mallards would be classed as showing little

<sup>3</sup> Information taken from records of the U.S. Weather Bureau, Burlington Municipal Airport.

change to a slight increase throughout, blue-winged teal and wood ducks as showing moderate increase. Because the black duck is most abundant over the State as a breeding species, the net effect on 1962 production in Vermont is probably one of little change to slight increase over that of 1961. An increase in average brood size among all species, a uniformity of age classes, a minority of class I broods in mid-July, and nesting surveys all contribute to the belief that 1962 nesting was about normal in point of time and that a high degree of success attended initial nesting attempts. As a corollary to this belief, renesting will be greatly reduced this year.

## CONNECTICUT

Data supplied by Ruth S. Billard  
Connecticut State Board of Fish  
and Game

### WEATHER AND HABITAT CONDITIONS

The 1962 growing season started rapidly but apparently stalled as cold weather dominated the late spring and early summer. Even in July, warm days were followed by cold nights with temperatures of 45° to 50°, or below, being common. The late season may have caused a late hatch of wood ducks. No wood duck broods were observed in the June count, and most of the broods seen in July were of age class II. Very few flying wood ducks and scarcely any adult males were seen.

Despite repeated reports of drought in the northeast, water levels in the marshes were not unduly low in early July. This prolonged dry spell, unless it becomes a great deal more acute in the next 2 weeks, should not affect production.

### PRODUCTION INDEXES

Brood censuses were conducted from June 4 to June 8, and July 5 to July 11 on 13 areas, and showed a slight increase in broods over the 1961 data. Wood duck young dropped slightly from 1961, while black duck juveniles showed an increase. In 1962, black ducks made up 28 percent of the wood duck and black duck juvenile populations; in 1961

they comprised 20 percent of the wood duck and black duck juvenile totals.

For the first time, both green-winged teal and blue-winged teal have appeared on the census areas. Broods of blue-winged teal were seen on two areas, while two broods of green-winged teal were noted on one area.

Heartening factors were the increase in areas containing waterfowl, and the fact that parts of the census areas that had not revealed birds for several years held one or more broods during these counts.

## CONCLUSIONS

In summary, our field data indicate a slight increase in black ducks and mallards, and a relatively static wood duck population. Both species of teal were recorded, for the first time, as breeding in the State.

## NEW JERSEY

Data supplied by F. Ferrigno  
Department of Conservation and  
Economic Development

### WEATHER AND HABITAT CONDITIONS

On March 6, a violent northeast storm--perhaps the worst within memory--smashed the New Jersey coastline. Damage was tremendous to both public and private property. All six impoundments at Tuckahoe experienced severe washouts that kept them drained throughout the production season. Numerous washouts also occurred in the small dikes that enclose thousands of acres of salt hay along the Delaware Bay. During periods of abnormally high tides, water rushed into these holes causing fluctuating and high water levels. Severe inundation of salt-hay meadows, Spartina alterniflora marshes, and S. patens, occurred during March and early May. Thereafter, limited rainfall and lack of abnormally high lunar or storm tides resulted in no severe inundation. Ideal nesting conditions persisted the remainder of the season. Precipitation departures from normal were +1.03 for March, +0.52 for April, -1.67 for May, and +1.37 for June.

## BREEDING POPULATION INDEXES

Breeding populations and pair counts were very misleading and difficult to interpret. The flooding of salt-hay meadows appeared to attract large numbers of waterfowl. On one count, on approximately 900 acres of flooded salt-hay marshes at Port Norris, 8 blue-winged teal, 12 black duck, and 11 gadwall pairs were recorded. The high water levels appeared to be very attractive to nesting pairs; however, water levels were not stable and the fluctuations that occurred were disastrous to early season nesting. An adult population of over 1,000 gadwalls and black ducks also complicated counts by traversing back and forth over the Port Norris and Egg Island study areas.

## PRODUCTION INDEXES

On the Tuckahoe area, with four less broods, the total young produced decreased from 48.8 in 1961 to 20.8 for 1962. This figure represents a decrease in production of 57.4 percent. The average brood size, 6.1, of the black ducks in 1961 decreased to 5.2 in 1962.

The results at Tuckahoe do not necessarily reflect overall breeding conditions in impoundments and inland ponds. It is felt that newer impoundments are more attractive to nesting pairs and that this attractiveness decreases with time. If this is so, then downward trends in production in recent years may be more of an indication of water management or the age of the impoundments, than of annual phenological conditions. In addition, the dike damage in 1962 is abnormal and may have accounted for the drop in the average brood size. Previous investigations have revealed that survival of young is much less in drawdown impoundments. Reduced water surfaces concentrate brood activity and underwater predators in the remaining ditches.

The results on Egg Island are clearly indicative of the excellent hatching conditions that prevailed during renesting attempts. Total production of both gadwalls and black ducks amounted to 109.4 young produced. This was comparable to last year's excellent production of 101.4 young produced. Inasmuch as all the broods were observed in July, it is contemplated that there was complete nest destruction by

adverse tides in early May. Water conditions and weather in 1962 were very similar to those of 1961. During both years, the heavy early season tidal destruction was followed by ideal nesting conditions.

On the clapper rail nest census study areas on the low Spartina alterniflora marshes near Ocean City, New Jersey, observations were made on a nesting pair of black ducks. Three attempts to hatch three clutches of eggs were futile because of tidal inundation. Clapper rails, which are more adaptive for nesting in this environment, avoid this loss by constructing nests well above the meadow level.

Production trends on the diked salt-hay marshes of the Port Norris area were similar to last year's. Although the high water levels that prevailed during March, April, and May attracted large numbers of black duck, gadwall, and blue-winged teal breeding pairs, early nesting losses to fluctuating water levels were heavy. In early May, over a week of continued easterly winds forced water through damaged dikes, flooding haying marshes with 2 to 3 feet of water. As a result, there was virtually complete destruction of existing nests. Last year, similar flooding in early May also accounted for 100 percent elimination of early nests. In both years, 1961 and 1962, high tides after May flooding were negligible and rainfall was properly spaced so that the water table did not fluctuate above the marsh. As a result, nesting success was excellent. To date, seven (78 percent) of the nine waterfowl nests under observation hatched successfully. Hatching peaks of haying meadows, as well as on the adjacent tidal areas, occurred in early July.

## CONCLUSIONS

Censuses conducted in different environments indicated that phenological and other conditions in 1962 were very similar to 1961. Therefore, no significant change in 1962 production is contemplated for Cumberland and Cape May Counties. Success of renesting attempts should supply ample young from the Delaware coastal marshes. If all the census areas are considered, a slight reduction is possible as a result of reduced production within the Tuckahoe-Corbin City impoundments.

## NORTHEASTERN STATES

Data supplied by U. S. Game Management Agents in Region 5, Bureau of Sport Fisheries and Wildlife

### WEATHER AND HABITAT CONDITIONS

The entire Northeast experienced a cold, late, dry spring with the exception of West Virginia, where conditions were comparable to those of 1961. Drought prevailed throughout May and June with high winds accelerating evaporation. Forest fires were numerous, with many marshes and lowland nesting covers burned over. Much of up-state New York has been declared a drought disaster area. New Jersey and Delaware reported dry, hot weather in June, with corn crop failures in Delaware.

### BREEDING POPULATION INDEXES

Breeding populations of blue-winged teal were reported to have increased 20 percent in Maine. Mallard and Canada goose breeders were reported to have made gains of 20 percent in Massachusetts, Pennsylvania, and New Jersey. Black ducks apparently decreased 20 percent in New Jersey.

### PRODUCTION INDEXES

Brood production on the larger, more permanent water areas has shown some increase. Conversely there has been a reduction in duck broods produced on the small, nonpermanent areas, many of which dried up. A definite increase is reported in Canada geese broods with this species rearing broods in Massachusetts, New Jersey, Pennsylvania, and New York for the first time on many new areas.

Mallards have also shown a general increase in nesting pairs but the broods or size of the broods have not been up to expectations. Mallard brood mortality was common in Pennsylvania. Blue-winged teal broods showed up well in Delaware. Wood duck production is reported to have been good. Black duck broods from early nesting are well developed; however, later broods are reported fewer with mortality of ducklings.

### CONCLUSIONS

Compared with 1961 and in consideration of the relative importance of the various waterfowl producing areas, indications are that the black duck and wood duck fall flight will be about the same as in 1961. Also indicated is a slight increase in the mallard flight, a fair increase in blue-winged teal, and a substantial increase in Canada geese in the 1962 fall flight.

## SUMMARY AND FALL FLIGHT FORECAST

Analysis supplied by Walter F. Crissey,  
Bureau of Sport  
Fisheries and Wildlife

### PACIFIC FLYWAY

### SUMMARY

### BREEDING POPULATION

The January 1962 winter survey revealed a small decrease in the number of ducks remaining after the shooting season as compared with the previous year (-7 percent).

The winter index is now 22 percent below the peak index reached in January 1959. It is perhaps significant to note that the number of mallards wintering in the Columbia Basin in Washington and Oregon remained at the same high level as in 1961.

In the breeding range supplying the Pacific Flyway there was a marked decrease in the number of ducks observed during the

May-June survey. In Alaska, although the total number of ducks remained about the same, mallards decreased 44 percent. In northern Alberta and the western part of the Northwest Territories a decrease in total ducks of 36 percent was recorded. In southern Alberta and southern Saskatchewan decreases of 33 percent and 47 percent, respectively, were recorded. Small decreases in breeding population were recorded in Montana, Washington, Utah, and California. Wyoming recorded a considerable increase in breeding population, but this was not sufficient to balance the decreases elsewhere. In view of the importance of the pintail in the Pacific Flyway, it is significant to note that the overall pintail breeding population index decreased 21 percent from 1961 and is now 42 percent below the average of the past 9 years and 60 percent below the peak level reached in 1956. The baldpate, another species important in the Pacific Flyway, decreased 41 percent from 1961 and is now 57 percent below the peak reached in 1959.

## HABITAT CONDITIONS

Generally speaking, weather and habitat conditions were not favorable in the breeding range supplying Pacific Flyway ducks. In the Canadian Prairies there is evidence that the drought of the past few years is breaking. Both the May and the July water index increased in the southern portions of the three Prairie Provinces. Unfortunately, much of this improvement followed spring migration. Large numbers of ponds were dry during late April and discouraged early nesting species. In some areas heavy rains later in the summer caused flooding that disrupted nesting. Unfortunately, the distribution of rainfall was poor, with a few locations having a great deal of water while most locations were still dry. In Alaska and the Northwest Territories spring break-up was late and there was considerable flooding of nesting habitat. Runoff was poor in eastern Washington, and although there was some improvement in California, water levels were below average. In contrast, conditions were reported to have been excellent in Wyoming and Utah.

## PRODUCTION

Production surveys during July reflected the late spring and flooding in the north and

the continued poor habitat conditions in the drought area. In Alaska it was concluded that duck production overall will be no better than 50 percent as good as last year with the early-nesting puddle ducks less than that and the late-nesting species perhaps slightly better. In the Northwest Territories partially completed surveys indicate a small reduction in production as compared with 1961, which was considerably below the average of previous years. In both southern Alberta and southern Saskatchewan, production is judged to be somewhat less than 1961 and the poorest recorded since breeding-ground surveys were initiated. In Montana and Utah, production prospects seem to be somewhat better than 1961 and are expected to balance the small decrease in breeding population. Small decreases are expected in the fall flight from Washington and California. Only in Wyoming is a marked increase expected in production.

The situation is unfavorable again this year for canvasback and redhead. The breeding populations of both species are still well below average and over-water nesting habitat at the beginning of the season this year was practically non-existent. Owing to water conditions this year, emergent vegetation grew luxuriantly, and some nesting occurred in this new growth. However, production of these two species is not expected to be more than sufficient to offset natural losses.

## FLIGHT FORECAST

### DUCKS

When the marked decrease in breeding population is combined with the expected low production, at least a moderate decrease in the 1962 fall flight of ducks in the Pacific Flyway is expected.

### GESE AND BRANT

According to the annual winter survey, populations of Canada geese and white-fronted geese did not change appreciably from last year (-8 percent and +7 percent, respectively). The population index for snow geese increased 17 percent and cackling geese increased 14 percent.

Since production data for geese are lacking, average production must be assumed. Therefore, it is estimated that the fall flight of all geese will be the same as in the 1961 fall flight, but as compared with 1960 the flights of snow and cackling geese will increase, while the flights of Canada geese and white-fronted geese will remain about the same.

The number of wintering brant decreased slightly as compared with 1961, but the population remained at a relatively high level. Limited surveys on the brant breeding

areas reveal that production is good. Therefore, a small increase in the fall flight of brant is expected.

## COOTS

Production of coots in all important breeding areas is expected to be markedly reduced by drought conditions. Therefore, a major reduction in the fall flight of coots is expected.

# CENTRAL FLYWAY

## SUMMARY

## BREEDING POPULATION

Despite a saving of about 850,000 ducks due to a reduced kill in the Central Flyway during the 1961 season (-45 percent), the January survey following the season revealed a decrease of about 1,000,000 ducks in the winter index (-23 percent). The winter index in the Flyway is now 58 percent below the peak number recorded in 1958. Although most duck populations have decreased, the mallard is the chief contributor to the decrease with an index 66 percent below the number recorded in January 1958.

On the breeding ground, the May-June surveys of areas important to the Central Flyway revealed that a decrease in duck population had occurred. Decreases of 23 percent, 47 percent, and 37 percent were recorded in southern Alberta, southern Saskatchewan, and southern Manitoba, respectively. Breeding populations in northern Alberta and the Northwest Territories decreased 36 percent. The surveys in Alaska revealed no change as compared with 1961. On the favorable side, an increase of 61 percent was recorded in the survey area composed of North Dakota, South Dakota, and western Minnesota. In northern Saskatchewan, northern Manitoba, and Ontario, collectively, an increase of 26 percent was recorded. Wyoming and Colorado recorded increases of 94 percent and 22 percent, respectively. When all areas are combined it is apparent that the Central Flyway began the season this year with a lower breeding

population than during any year in recent times.

## HABITAT CONDITIONS

There are indications that the recent drought period in the important mid-Continent pothole breeding habitat is breaking. During May the survey in the southern parts of the three Prairie Provinces recorded an increase of 22 percent in the number of water areas. In these same areas during July there were 49 percent more ponds than were recorded in 1961. Distribution of rainfall was poor, with a few locations having a great deal of water while most areas were still dry. Many of the ponds this year were of poor quality, and in several locations the ponds regained water too late in the nesting season to have a favorable effect on production. In the Dakotas and western Minnesota the pond index more than doubled as compared with 1961, both in May and in July, and the index is now above the average of the previous 12 years. Sufficient rain fell in some locations to disrupt nesting by flooding. In northern Alberta, the Northwest Territories, and Alaska, spring breakup was late and there was considerable flooding which destroyed nests. Although the spring was somewhat late in northern Saskatchewan, northern Manitoba, and Ontario, conditions following breakup were quite favorable to production.

In Montana there was improvement in some parts of the State while water levels deteriorated in other parts. Habitat and weather conditions were judged to be excellent in Wyoming and Colorado. In general, conditions were not conducive to good production.

## PRODUCTION

Production surveys during July 1962 reflected the adverse weather and habitat conditions that existed. In Alaska, it was judged that the production of early-nesting species would be reduced by about half as compared with 1961. In northern Alberta and the Northwest Territories partial coverage revealed a further reduction from the low production level of 1961. Survey crews in the southern portions of the three Prairie Provinces were universally in agreement that production this summer was less than at any time since breeding-ground surveys were initiated. July surveys in Nebraska also revealed a marked decrease in production as compared with 1961. In contrast, production was judged to be much better in the northern portions of Saskatchewan, Manitoba, and Ontario. Marked increases were recorded in Wyoming and Colorado. In the survey area composed of North Dakota and South Dakota the survey crews concluded that production improved somewhat as compared with 1961 but did not measure up to the large increase in breeding population recorded during May.

## FLIGHT FORECAST

### DUCKS

When the decrease in breeding population is combined with the poor prospects

for production in critical areas, it is expected that there will be at least a moderate decrease in the fall flight of ducks in the Central Flyway as compared with 1961.

### GESE

The total wintering geese in the Central Flyway decreased 11 percent from 1961; however, the decrease was made up entirely of blue geese and may have involved a shift in wintering location between Texas and Louisiana. Populations of snow geese and Canada geese remained unchanged, while the number of white-fronted geese increased in the survey from 15,000 in 1961 to 24,000 in 1962.

Since goose production data are lacking, average production is assumed. Therefore, it is expected that the fall flight of all species of geese will be the same as 1961. Compared with 1960, it is expected that the fall flight of snow geese and Canada geese will be about the same, while the flight of white-fronted geese may increase somewhat.

### COOTS

The production of coots in all important breeding areas is expected to be markedly reduced by drought conditions. Therefore, a major reduction in the fall flight of coots is expected.

## MISSISSIPPI FLYWAY

### SUMMARY

### BREEDING POPULATION

Despite a saving of approximately  $1\frac{1}{4}$  million ducks due to a reduced harvest last season, the January survey following the season revealed a decrease of nearly  $1\frac{1}{4}$  million ducks in the winter index (-15 percent). Perhaps a more pertinent statistic is the mallard winter index which decreased from 3,250,000 in 1961 to 1,995,000 in 1962 (-39 percent) in spite of a reduction of kill of about 684,000 birds.

The breeding-ground surveys during May

and June in areas important to the Mississippi Flyway also revealed that a marked decrease in breeding populations had occurred. Although there was no change in the breeding-population index in Alaska, the index decreased 36 percent in the northern part of Alberta and the Northwest Territories. In southern Alberta, southern Saskatchewan, and southern Manitoba, decreases of 23 percent, 47 percent, and 37 percent, respectively, were recorded. On the favorable side of the ledger, an increase of 61 percent was recorded in the survey area composed of North Dakota, South Dakota, and western Minnesota. An increase of 26 percent was recorded in the survey area composed of northern

Saskatchewan, northern Manitoba, and Ontario. Increases in breeding population were found also in Michigan, Indiana, and Missouri, although the number of birds involved in these States is small.

When all of the Mississippi Flyway breeding areas are viewed collectively, it is concluded that the Flyway began the 1962 season with a sharply reduced breeding population of most species of ducks. This is in contrast to the data obtained on the wintering grounds concerning the status of some species. For example, either peak or near peak populations during recent years were recorded in January 1962 for pintails, baldpates, blue-winged teal, and shovelers. However, breeding ground data indicate that the 1962 populations of these species range from 30 to 43 percent below the average of the past 9 years; from 44 to 60 percent below the peak population reached in recent years; and from 21 to 40 percent below 1961. The primary reason for the increased wintering populations of these species in the Mississippi Flyway seems to be the excellent condition of the habitat in coastal Louisiana. In view of the fact that populations of these species wintering in the Flyway increased during a period when their overall populations were decreasing because of drought on the breeding areas, it is concluded that these increases in wintering population represent an attraction of birds from wintering areas outside the Flyway.

## HABITAT CONDITIONS

There are indications that the recent drought period in the important mid-Continent pothole breeding habitat is breaking. During the May survey in the southern portion of the three Prairie Provinces an increase of 22 percent in the number of water areas was recorded. In these same areas during July there were 49 percent more ponds than were recorded in 1961. Distribution of rainfall was poor, with a few locations having a great deal of water while most areas were still dry. Many of the ponds this year were of poor quality, and in several locations the ponds regained water too late in the nesting season to have a favorable effect on production. In the Dakotas and western Minnesota the pond

Note: Since general area provides birds to both Central and Mississippi Flyways habitat conditions as described above were simply repeated.

index more than doubled as compared with last year both in May and in July, and the index is above the average of the previous 12 years. Sufficient rain fell in some locations to disrupt nesting, by flooding. In northern Alberta, the Northwest Territories, and Alaska, spring breakup was late and there was considerable flooding which destroyed nests. Although the spring was somewhat late in northern Saskatchewan, northern Manitoba, and Ontario, conditions following breakup were quite favorable to production. With few exceptions habitat conditions were not conducive to good production in the breeding range supplying the Mississippi Flyway.

## PRODUCTION

Production surveys during July 1962 reflected the adverse weather and habitat conditions that existed. In Alaska, it was judged that the production of early-nesting species would be reduced by about half as compared with 1961. In northern Alberta and the Northwest Territories partial surveys revealed a further reduction from the low production level of 1961. Survey crews in the southern portions of the three Prairie Provinces were universally in agreement that production this summer was less than at any time since breeding-ground surveys were initiated. Production surveys in Nebraska also revealed a marked decrease in production as compared with 1961. In contrast, production was judged to be much better in the northern portions of Saskatchewan, Manitoba and Ontario. In the survey area composed of North Dakota and South Dakota, the survey crews concluded that production improved somewhat as compared with 1961 but did not measure up to the rather large increase in breeding population recorded in May. In Minnesota it was judged that production would be about equal to last year (1961).

For canvasbacks and redheads the situation is again unfavorable. Over-water nesting habitat was at a minimum during the nesting season this year owing to the very dry conditions in 1961. Improved water this year caused luxuriant growth of emergent vegetation which provided some nesting habitat late in the nesting period. However, production of these two species is not expected to be more than sufficient to offset natural losses.

## FLIGHT FORECAST

### DUCKS

When the decrease in breeding population is combined with the poor prospects for production in critical areas, it is expected that there will be a moderate decrease in the fall flight of ducks in the Mississippi Flyway as compared with 1961.

### GESE

The wintering population of geese in the Mississippi Flyway decreased 20 percent as compared with 1961. The population of Canada geese remained the same (-3 percent), while blue geese decreased 32 percent, snow geese decreased 24 percent,

and white-fronted geese decreased 19 percent.

Since goose production data are lacking, average production is assumed. Therefore, it is expected that the fall flight of all species of geese will be the same as 1961. Compared with 1960, it is expected that the fall flight of Canada geese will be about the same, while the flight of snow, blue, and white-fronted geese will decrease somewhat.

### COOTS

The production of coots in all important breeding areas is expected to be markedly reduced by drought conditions. Therefore, a major reduction of this species in the fall flight is expected.

## ATLANTIC FLYWAY

### SUMMARY

### BREEDING POPULATION

In forecasting changes in the fall flight, breeding-ground survey data cannot be used to so great an extent in the Atlantic Flyway as in the other three Flyways. This is due primarily to lack of adequate technique for conducting surveys in the important Quebec-Labrador breeding area. Therefore, it is necessary to depend to a large extent on the results of the annual winter surveys for determining trends in the breeding population for the Flyway.

The number of wintering ducks in the Flyway, based on the January 1962 survey, decreased slightly (-7 percent). For the fifth consecutive year the winter population index has remained at somewhat less than the  $2\frac{1}{2}$  million level as compared with the 5-year period 1952-56, when the duck index averaged nearly  $4\frac{1}{4}$  million. Most of the important species of ducks, with the exception of the wood duck, are involved in the lower population levels during recent years. It is significant to note that the black duck maintained its level as compared with 1961 (+3 percent), while the pintail and the mallard decreased as expected, owing to the drought in the West (-19 percent and -34 percent, respectively).

Western areas supplying birds to the Atlantic Flyway recorded both increases and decreases in breeding populations during the May-June surveys. Breeding populations in Alaska remained unchanged, but a sharp decrease was recorded in northern Alberta and the Northwest Territories (-36 percent). In southern Saskatchewan and southern Manitoba decreases of 47 percent and 37 percent, respectively, were recorded. In the northern portions of Saskatchewan, Manitoba, and Ontario there was an increase of 26 percent in breeding population; however, this was not nearly enough to balance the decreases elsewhere. It is concluded that the breeding population in western areas associated with the Atlantic Flyway decreased considerably as compared with 1961.

### HABITAT CONDITIONS

In the Canadian Prairies there were signs that the drought condition of the past few years is breaking. Water levels were much improved in some locations, but dry conditions still persist in most of the area. In the Northwest Territories and in Alaska spring breakup was late, and there was considerable flooding which destroyed nests. Although the spring was somewhat late in northern Saskatchewan, northern

Manitoba, and Ontario, conditions following breakup were quite favorable to production.

## PRODUCTION

Surveys during July revealed that production will be markedly reduced in Alaska. Surveys, partially completed, in northern Alberta and the Northwest Territories revealed that a small reduction is likely. In southern Saskatchewan and southern Manitoba, production is judged to be less than in 1961 and the poorest recorded since breeding-ground surveys were initiated. In northern Saskatchewan, northern Manitoba, and Ontario production is judged to be considerably improved as compared with 1961. An increased fall flight is expected from Maine and the remaining Northeastern States; collectively, they are expected to provide about the same number of birds as in 1961.

For canvasbacks and redheads the situation is again unfavorable. Over-water nesting habitat was at a minimum during the nesting season this year as a result of the very dry conditions last year. Improved water conditions this year caused luxuriant growth of emergent vegetation which provided some suitable habitat late in the nesting period. However, production of these two species is not expected to be more than sufficient to offset natural losses.

Since production-survey data are lacking from Quebec and Labrador, it must be assumed that in this region production will be average. On this basis, it is estimated that the fall flight of waterfowl from this region will remain about the same as last year (1961).

## FLIGHT FORECAST

### DUCKS

When all sources of information are combined it is expected that there will be a decrease among species that come primarily from western breeding areas and no change among those coming from the Northeast. The net effect will be a small decrease in ducks in the Atlantic Flyway this year.

### GEESE

Weather appears to have been unfavorable during the summer of 1961 in northern breeding areas, since most arctic nesting species decreased last fall. In the Atlantic Flyway, the Canada goose, the brant, and the swans decreased 24 percent, 54 percent, and 37 percent, respectively. Since production data are lacking, average production is assumed for 1962. Therefore, for Canada geese and brant it is estimated that the fall flight will be approximately the same as 1961. Compared with 1960, a moderate decrease is expected in the flight of Canada geese and a marked decrease in the flight of brant.

### COOTS

The production of coots in all important breeding areas is expected to be markedly reduced by drought conditions. Therefore, a major reduction in the fall flight of this species is expected.

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# APPENDIX

## A. WATERFOWL KILL SURVEY TABLES

TABLE A-1.--Waterfowl kill in Pacific Flyway, seasons 1960-61 and 1961-62

| Species                  | 1960-1961           | 1961-1962           | Percent change <sup>1</sup> |
|--------------------------|---------------------|---------------------|-----------------------------|
| <b>Ducks:</b>            |                     |                     |                             |
| Dabblers:                |                     |                     |                             |
| Pintail-----             | 502,400             | 327,000             | --                          |
| Mallard-----             | 711,800             | 608,600             | --                          |
| American widgeon-----    | 330,100             | 305,400             | --                          |
| Shoveler-----            | 165,000             | 131,800             | --                          |
| Gadwall-----             | 31,100              | 35,500              | --                          |
| Blue-winged teal-----    | <sup>2</sup> 62,400 | 34,800              | --                          |
| Green-winged teal-----   | 255,500             | 219,700             | --                          |
| Cinnamon teal-----       | --                  | --                  | --                          |
| Wood duck-----           | 14,000              | 11,300              | --                          |
| Subtotal-----            | 2,072,300           | 1,674,100           | --                          |
| Divers:                  |                     |                     |                             |
| Scaup-----               | 63,300              | <sup>3</sup> 26,300 | --                          |
| Canvasback-----          | 5,300               | 1,200               | --                          |
| Redhead-----             | 2,300               | 3,400               | --                          |
| Ring-necked duck-----    | 7,800               | 10,200              | --                          |
| Goldeneye-----           | 24,800              | <sup>4</sup> 16,000 | --                          |
| Bufflehead-----          | 25,100              | 17,800              | --                          |
| Ruddy duck-----          | 27,600              | 21,800              | --                          |
| Subtotal-----            | 156,200             | 96,700              | --                          |
| Miscellaneous:           |                     |                     |                             |
| Scooter-----             | 6,600               | 2,000               | --                          |
| Merganser-----           | 9,800               | 2,500               | --                          |
| Other <sup>2</sup> ----- | 900                 | 700                 | --                          |
| Subtotal-----            | 17,300              | 5,200               | --                          |
| Total: <sup>5</sup>      |                     |                     |                             |
| Retrieved-----           | 2,246,000           | 1,776,000           | -21                         |
| Not retrieved-----       | 590,000             | 408,000             | -31                         |
| Ducks killed-----        | 2,836,000           | 2,184,000           | -23                         |
| Geese:                   |                     |                     |                             |
| Retrieved-----           | 259,900             | 181,000             | -30                         |
| Not retrieved-----       | 88,200              | 38,900              | -56                         |
| Geese killed-----        | 348,100             | 219,900             | -37                         |
| Coot:                    |                     |                     |                             |
| Retrieved-----           | 59,500              | 58,400              | -2                          |
| Not retrieved-----       | 74,900              | 50,700              | -32                         |
| Coots killed-----        | 134,400             | 109,100             | -19                         |

<sup>1</sup> Species percentage comparisons omitted: 1961-62 estimates from the Bureau's Duck-wing survey and 1960-61 estimates from mail questionnaire reports.

<sup>2</sup> Estimate for 1960-61 considered unreliable: see Special Scientific Report--Wildlife No. 55.

<sup>3</sup> Includes 4,600 greater scaup

<sup>4</sup> Includes 900 Barrow's goldeneye

<sup>5</sup> Duck totals rounded off to nearest thousand.

TABLE A-2. --State and flyway estimates of reported total duck bag and average duck bag per hunter, with respective percentage changes, for the 1961-62 and 1960-61 hunting seasons Pacific Flyway (Excluding Montana)

| State             | Daily bag limit                |         | Length of season (days) |                   | Estimated total bag (unadjusted for response bias) |           |                | Reported seasonal bag per hunter |         |                |
|-------------------|--------------------------------|---------|-------------------------|-------------------|--|-----------|----------------|----------------------------------|---------|----------------|
|                   | 1960-61                        | 1961-62 | 1960-61                 | 1961-62           | 1960-61  | 1961-62   | Percent change | 1960-61                          | 1961-62 | Percent change |
| Washington-----   | 4-8                            | 4-8     | 90                      | 75                | 484,600  | 493,200   | +2             | 9.04                             | 9.81    | +9             |
| Oregon-----       | 4-8                            | 4-8     | 90                      | 75                | 238,100  | 196,200   | -18            | 7.16                             | 6.96    | -3             |
| Total-----        |                                |         |                         |                   | 722,700  | 689,400   | -5             | 8.32                             | 8.79    | +6             |
| Idaho-----        | 5-5                            | 5-5     | 90                      | 75                | 202,100  | 237,100   | +17            | 9.29                             | 11.15   | +20            |
| Utah-----         | 5-5                            | 5-5     | 90                      | 75                | 235,500  | 154,700   | -34            | 11.22                            | 9.07    | -19            |
| Total-----        |                                |         |                         |                   | 437,600  | 391,800   | -10            | 10.24                            | 10.22   | 0              |
| Nevada-----       | 4-8                            | 5-5     | 90                      | 65                | 44,700   | 30,400    | -32            | 6.61                             | 6.48    | -2             |
| Arizona-----      | 4-8                            | 4-8     | 86-90                   | <sup>1</sup> 68-S | 30,700   | 21,200    | -31            | 5.33                             | 3.69    | -31            |
| California-----   | 6-6                            | 5-5     | 1 67-S                  | <sup>1</sup> 68-S | 1,607,800  | 1,116,600 | -31            | 15.40                            | 12.28   | -20            |
| Montana-----      | (Included with Central Flyway) |         |                         |                   |  |           |                |                                  |         |                |
| Flyway total----- |                                |         |                         |                   | 2,843,000  | 2,249,000 | -21            | 11.53                            | 10.31   | -11            |

<sup>1</sup> Indicates split season.

TABLE A-3.--Activity of United States waterfowl hunters during the 1961-62 hunting season with 1960-61 hunting season comparison, Pacific Flyway<sup>1</sup>

| State             | Daily duck bag and possession limit |           | Length of duck season (days) |                                     | Total active hunters |                |                |
|-------------------|-------------------------------------|-----------|------------------------------|-------------------------------------|----------------------|----------------|----------------|
|                   | 1960-61                             | 1961-62   | 1960-61                      | 1961-62                             | 1960-61              | 1961-62        | Percent change |
| Washington-----   | 4-8                                 | 4-8       | 90                           | 75                                  | 53,600               | 50,270         | -6             |
| Oregon-----       | 4-8                                 | 4-8       | 90                           | 75                                  | 33,260               | 28,190         | -15            |
| Total-----        | 4-8                                 | 4-8       | 90                           | 75                                  | 86,860               | 78,460         | -10            |
| Idaho-----        | 5-5                                 | 5-5       | 90                           | 75                                  | 21,760               | 21,270         | -2             |
| Utah-----         | 5-5                                 | 5-5       | 90                           | 75                                  | 20,980               | 17,050         | -19            |
| Total-----        | 5-5                                 | 5-5       | 90                           | 75                                  | 42,740               | 38,320         | -10            |
| Nevada-----       | 4-8                                 | 5-5       | 90                           | 65                                  | 6,760                | 4,690          | -31            |
| Arizona-----      | 4-8                                 | 4-8       | 86-90                        | 68-S <sup>2</sup>                   | 5,760                | 5,740          | 0              |
| California-----   | 6-6                                 | 5-5       | 67-S <sup>2</sup>            | 68-S <sup>2</sup>                   | 104,380              | 90,900         | -13            |
| Montana-----      | (Included with Central Flyway)      |           |                              |                                     |                      |                |                |
| Flyway Total----- |                                     |           |                              |                                     | 246,500              | 218,110        | -11            |
| State             | Total hunter-days <sup>2</sup>      |           |                              | Days hunted <sup>1</sup> per hunter |                      |                |                |
|                   | 1960-61                             | 1961-62   | Percent change               | 1960-61                             | 1961-62              | Percent change |                |
| Washington-----   | 402,500                             | 366,200   | -9                           | 7.51                                | 7.29                 | -3.0           |                |
| Oregon-----       | 213,200                             | 169,800   | -20                          | 6.41                                | 6.02                 | -6.0           |                |
| Total-----        | 615,700                             | 536,000   | -13                          | 7.09                                | 6.83                 | -3.6           |                |
| Idaho-----        | 144,500                             | 131,600   | -9                           | 6.64                                | 6.19                 | -6.8           |                |
| Utah-----         | 124,800                             | 99,900    | -20                          | 5.95                                | 5.86                 | -1.5           |                |
| Total-----        | 269,300                             | 231,500   | -14                          | 6.30                                | 6.04                 | -4.1           |                |
| Nevada-----       | 45,400                              | 24,600    | -46                          | 6.72                                | 5.25                 | -21.9          |                |
| Arizona-----      | 27,200                              | 27,700    | +2                           | 4.72                                | 4.83                 | +2.2           |                |
| California-----   | 626,400                             | 548,100   | -13                          | 6.00                                | 6.03                 | +0.5           |                |
| Montana-----      | --                                  | --        | --                           | --                                  | --                   | --             |                |
| Flyway total----- | 584,000                             | 1,367,900 | -14                          | 6.43                                | 6.27                 | -2.4           |                |

<sup>1</sup> Estimates of hunter-days unadjusted for possible response bias.

<sup>2</sup> Indicates split season.

TABLE A-4.--Waterfowl kill in Central Flyway, seasons 1960-61 and 1961-62

| Species                | 1960-61              | 1961-62             | Percent change <sup>1</sup> |
|------------------------|----------------------|---------------------|-----------------------------|
| Ducks:                 |                      |                     |                             |
| Dabblers:              |                      |                     |                             |
| Pintail-----           | 143,100              | 50,700              |                             |
| Mallard-----           | 691,000              | 432,500             |                             |
| American widgeon-----  | 46,700               | 52,600              |                             |
| Shoveler-----          | 53,300               | 22,400              |                             |
| Gadwall-----           | 37,400               | 26,100              |                             |
| Blue-winged teal-----  | <sup>2</sup> 105,600 | 8,800               |                             |
| Green-winged teal----- | 188,700              | 101,000             |                             |
| Cinnamon teal-----     | --                   | --                  |                             |
| Black duck-----        | 16,400               | 2,100               |                             |
| Wood duck-----         | 12,500               | 8,100               |                             |
| Mottled duck-----      | --                   | 13,700              |                             |
| Subtotal-----          | 1,294,700            | 718,000             |                             |
| Divers:                |                      |                     |                             |
| Scaup-----             | 59,500               | <sup>3</sup> 54,500 |                             |
| Canvasback-----        | 4,300                | 400                 |                             |
| Redhead-----           | 1,300                | 3,200               |                             |
| Ring-necked duck-----  | 14,300               | 13,300              |                             |
| Goldeneye-----         | 7,100                | 2,400               |                             |
| Bufflehead-----        | 7,500                | 2,900               |                             |
| Ruddy duck-----        | 7,100                | 1,900               |                             |
| Subtotal-----          | 101,100              | 78,600              |                             |
| Miscellaneous:         |                      |                     |                             |
| Scoter-----            | 200                  | 200                 |                             |
| Merganser-----         | 7,100                | 1,000               |                             |
| Other-----             | --                   | 2,400               |                             |
| Subtotal-----          | 7,300                | 3,600               |                             |
| Total: <sup>4</sup>    |                      |                     |                             |
| Retrieved-----         | 1,403,000            | 800,000             | -43                         |
| Not retrieved-----     | 471,000              | 226,000             | -52                         |
| Ducks killed-----      | 1,874,000            | 1,026,000           | -45                         |
| Geese:                 |                      |                     |                             |
| Retrieved-----         | 214,900              | 197,000             | -8                          |
| Not retrieved-----     | 73,600               | 43,100              | -41                         |
| Geese killed-----      | 288,500              | 240,100             | -17                         |
| Coots:                 |                      |                     |                             |
| Retrieved-----         | 24,200               | 12,900              | -47                         |
| Not retrieved-----     | 32,500               | 9,000               | -72                         |
| Coots killed-----      | 56,700               | 21,900              | -61                         |

<sup>1</sup> Species comparisons omitted: 1961-62 estimates, from the Bureau's duck survey and 1960-61 estimates from mail-questionnaire survey.

<sup>2</sup> Estimate for 1960-61 considered unreliable: see Special Scientific Report Wildlife No. 55.

<sup>3</sup> Includes 1,500 greater scaup.

<sup>4</sup> Duck totals rounded off to nearest thousand.

TABLE A-5.--State and flyway estimates of reported total duck bag and average duck bag per hunter, with respective percentage changes, for the 1961-62 and 1960-61 hunting seasons Central Flyway (including Montana)

| State                      | Daily bag limit |                       | Length of season (days) |                    | Estimated total bag (unadjusted for response bias) |           |                | Reported seasonal bag per hunter |         |                |
|----------------------------|-----------------|-----------------------|-------------------------|--------------------|--|-----------|----------------|----------------------------------|---------|----------------|
|                            | 1960-61         | 1961-62               | 1960-61                 | 1961-62            | 1960-61  | 1961-62   | Percent change | 1960-61                          | 1961-62 | Percent change |
| Colorado-----              | 3-6             | 3-6                   | 60                      | 30                 | 138,600  | 71,100    | -49            | 5.49                             | 3.38    | -38            |
| Kansas-----                | 3-6             | 3-6                   | 60                      | 30                 | 218,300  | 149,400   | -32            | 5.70                             | 4.98    | -13            |
| Oklahoma-----              | 3-6             | 3-6                   | 60                      | 30                 | 163,300  | 78,000    | -52            | 6.25                             | 4.86    | -22            |
| Total-----                 |                 |                       |                         |                    | 520,200  | 298,500   | -43            | 5.80                             | 4.45    | -23            |
| Wyoming-----               | 3-6             | 2-4                   | 60                      | 40                 | 36,900   | 22,800    | -38            | 6.65                             | 5.33    | -20            |
| North Dakota-----          | 4-8             | 3-6                   | 50                      | 30                 | 258,000  | 98,000    | -62            | 7.38                             | 4.42    | -40            |
| Texas-----                 | 4-8             | 3-6                   | 50                      | 30                 | 465,000  | 248,500   | -47            | 5.77                             | 5.21    | -10            |
| Totals-----                |                 |                       |                         |                    | 723,000  | 346,500   | -52            | 6.25                             | 4.96    | -21            |
| New Mexico-----            | 4-8             | 3-6                   | 50                      | <sup>1</sup> 27-S  | 6,700  | 8,800     | +31            | 2.86                             | 3.78    | +32            |
| South Dakota-----          | 4-8             | 2-4                   | 50                      | 40                 | 300,500  | 131,200   | -56            | 7.86                             | 4.78    | -39            |
| Nebraska-----              | 4-8             | 2-4                   | 50                      | 40                 | 212,200  | 147,600   | -30            | 5.64                             | 5.35    | -5             |
| Total-----                 |                 |                       |                         |                    | 512,700  | 278,800   | -46            | 6.76                             | 5.06    | -25            |
| Montana <sup>2</sup> ----- | 4-8             | 3-6<br>(5-10<br>Pac.) | 50                      | 30<br>(60<br>Pac.) | 104,100  | 126,900   | +22            | 5.32                             | 7.41    | +39            |
| Flyway totals-----         |                 |                       |                         |                    | 1,904,000  | 1,082,000 | -43            | 6.17                             | 5.02    | -19            |

<sup>1</sup> Indicates split season.

<sup>2</sup> Included in Central Flyway.

TABLE A-6.--Activity of United States waterfowl hunters during the 1961-62 hunting season, with 1960-61 hunting season comparisons, Central Flyway (Including Montana)<sup>1</sup>

| State              | Daily duck bag and possession limit |                       | Length of duck season (days) |                        | Total active hunters |                |                |
|--------------------|-------------------------------------|-----------------------|------------------------------|------------------------|----------------------|----------------|----------------|
|                    | 1960-61                             | 1961-62               | 1960-61                      | 1961-62                | 1960-61              | 1961-62        | Percent change |
| Colorado-----      | 3-6                                 | 3-6                   | 60                           | 30                     | 25,240               | 21,040         | -17            |
| Kansas-----        | 3-6                                 | 3-6                   | 60                           | 30                     | 38,310               | 29,990         | -22            |
| Oklahoma-----      | 3-6                                 | 3-6                   | 60                           | 30                     | 26,120               | 16,060         | -39            |
| Total-----         |                                     |                       |                              |                        | 89,670               | 67,090         | -25            |
| Wyoming-----       | 3-6                                 | 2-4                   | 60                           | 40                     | 5,550                | 4,280          | -23            |
| North Dakota-----  | 4-8                                 | 3-6                   | 50                           | 30                     | 34,960               | 22,180         | -37            |
| Texas-----         | 408                                 | 3-6                   | 50                           | 30                     | 80,640               | 47,680         | -41            |
| Total-----         |                                     |                       |                              |                        | 115,600              | 69,860         | -40            |
| New Mexico-----    | 4-8                                 | 3-6                   | 50                           | 2 <sup>2</sup> 27-S    | 2,340                | 2,330          | 0              |
| South Dakota-----  | 4-8                                 | 2-4                   | 50                           | 40                     | 38,240               | 27,460         | -28            |
| Nebraska-----      | 4-8                                 | 2-4                   | 50                           | 40                     | 37,610               | 27,590         | -27            |
| Total-----         |                                     |                       |                              |                        | 75,850               | 55,050         | -27            |
| Montana-----       | 4-8                                 | 3-6<br>(5-10<br>Pac.) | 50                           | 30<br>(60<br>Pac.)     | 19,570               | 17,130         | -13            |
| Flyway totals----- |                                     |                       |                              |                        | 308,580              | 215,640        | -30            |
| State              | Total hunter-day <sup>2</sup>       |                       |                              | Days hunted per hunter |                      |                |                |
|                    | 1960-61                             | 1961-62               | Percent change               | 1960-61                | 1961-62              | Percent change |                |
| Colorado-----      | 172,400                             | 99,600                | -42                          | 6.83                   | 4.73                 | -30.7          |                |
| Kansas-----        | 264,800                             | 173,700               | -34                          | 6.91                   | 5.79                 | -16.2          |                |
| Oklahoma-----      | 197,700                             | 88,100                | -55                          | 7.57                   | 5.49                 | -27.5          |                |
| Total-----         | 634,900                             | 361,400               | -43                          | 7.08                   | 5.39                 | -23.9          |                |
| Wyoming-----       | 41,900                              | 24,300                | -42                          | 7.55                   | 5.68                 | -24.8          |                |
| North Dakota-----  | 191,400                             | 120,100               | -37                          | 5.46                   | 5.42                 | -1.1           |                |
| Texas-----         | 382,200                             | 234,900               | -39                          | 4.74                   | 4.93                 | +3.9           |                |
| Total-----         | 573,600                             | 355,000               | -38                          | 4.96                   | 5.08                 | +2.4           |                |
| New Mexico-----    | 10,200                              | 11,500                | +13                          | 4.36                   | 4.94                 | +13.2          |                |
| South Dakota-----  | 229,800                             | 207,600               | -10                          | 6.01                   | 7.56                 | +25.8          |                |
| Nebraska-----      | 278,800                             | 180,100               | -35                          | 7.41                   | 6.53                 | -11.9          |                |
| Total-----         | 508,600                             | 387,700               | -24                          | 6.71                   | 7.04                 | +5.0           |                |
| Montana-----       | 86,600                              | 90,900                | +5                           | 4.43                   | 5.31                 | +19.9          |                |
| Flyway total-----  | 1,855,800                           | 1,230,800             | -34                          | 6.01                   | 5.71                 | -5.1           |                |

<sup>1</sup> Estimates of hunter-days unadjusted for possible response bias.

<sup>2</sup> Indicates split season.

TABLE A-7.--Waterfowl kill in Mississippi Flyway, seasons 1960-61 and 1961-62<sup>1</sup>

| Species                       | 1960-61              | 1961-62             | Percent change |
|-------------------------------|----------------------|---------------------|----------------|
| <b>Ducks:</b>                 |                      |                     |                |
| Dabblers:                     |                      |                     |                |
| Pintail-----                  | 130,300              | 77,500              | -41            |
| Mallard-----                  | 1,516,400            | 831,000             | -45            |
| American widgeon-----         | 145,100              | 97,300              | -33            |
| Shoveler-----                 | 47,400               | 17,300              | -64            |
| Gadwall-----                  | 56,300               | 38,800              | -31            |
| Blue-winged teal-----         | 174,800              | 41,500              | -76            |
| Green-winged teal-----        | 180,700              | 139,500             | -23            |
| Black duck-----               | <sup>2</sup> 139,300 | <sup>3</sup> 61,600 | -57            |
| Wood duck-----                | 142,200              | 103,500             | -27            |
| Mottled and Florida duck----- | 15,500               | 16,200              | +4             |
| Subtotal-----                 | 2,548,000            | 1,424,200           | -44            |
| Divers:                       |                      |                     |                |
| Scaup <sup>4</sup> -----      | 139,200              | 159,500             | +15            |
| Canvasback-----               | --                   | 200                 | --             |
| Redhead-----                  | 6,000                | 1,700               | -72            |
| Ring-necked duck-----         | 207,300              | 78,400              | -62            |
| Goldeneye-----                | 14,800               | 5,900               | -60            |
| Bufflehead-----               | 23,700               | 13,700              | -42            |
| Ruddy duck-----               | 17,800               | 4,000               | -78            |
| Subtotal-----                 | 408,800              | 263,400             | -36            |
| Miscellaneous:                |                      |                     |                |
| Scoter-----                   | <sup>5</sup> 3,000   | 400                 | -87            |
| Merganser-----                | <sup>5</sup> 11,900  | 8,700               | -27            |
| Other-----                    | <sup>6</sup> 6,000   | 4,500               | --             |
| Subtotal-----                 | 20,900               | 13,600              | -35            |
| Total: <sup>7</sup>           |                      |                     |                |
| Retrieved-----                | 2,978,000            | 1,701,000           | -43            |
| Not retrieved-----            | 1,055,000            | 555,000             | -47            |
| Ducks killed-----             | 4,033,000            | 2,256,000           | -44            |
| Geese:                        |                      |                     |                |
| Retrieved-----                | 178,000              | 166,000             | -7             |
| Not retrieved-----            | 65,100               | 40,700              | -37            |
| Geese killed-----             | 243,100              | 206,700             | -15            |
| Coots:                        |                      |                     |                |
| Retrieved-----                | 195,100              | 69,900              | -64            |
| Not retrieved-----            | 135,700              | 33,100              | -76            |
| Coots killed-----             | 330,800              | 103,000             | -69            |

<sup>1</sup> Species composition derived from duck wing survey.<sup>2</sup> Includes 6,000 black-mallard cross.<sup>3</sup> " 3,800 " " " .<sup>4</sup> Includes 29,600 greater scaup in 1960-61 and 8,800 greater scaup in 1961-62.<sup>5</sup> Includes 8,900 hooded and 3,000 red-breasted and common mergansers.<sup>6</sup> Includes 3,000 oldsquaw and eiders.<sup>7</sup> Duck totals to nearest thousand.

TABLE A-8.--State and flyway estimates of reported duck total bag and average duck bag per hunter, with respective percentage changes, for the 1961-62 and 1960-61 hunting seasons, Mississippi Flyway

| State              | Daily bag limit |         | Length of season (days) |                   | Estimated total bag (unadjusted for response bias) |           |                | Reported seasonal bag per hunter |         |                |
|--------------------|-----------------|---------|-------------------------|-------------------|--|-----------|----------------|----------------------------------|---------|----------------|
|                    | 1960-61         | 1961-62 | 1960-61                 | 1961-62           | 1960-61  | 1961-62   | Percent change | 1960-61                          | 1961-62 | Percent change |
|                    |                 |         |                         |                   |  |           |                |                                  |         |                |
| Wisconsin-----     | 3-6             | 2-4     | 50                      | 30                | 551,300  | 389,000   | -29            | 5.75                             | 4.93    | -14            |
| Iowa-----          | 3-6             | 2-4     | 50                      | 30                | 210,600  | 166,400   | -21            | 5.20                             | 4.79    | -16            |
| Missouri-----      | 3-6             | 2-4     | 50                      | 30                | 217,500  | 158,200   | -27            | 5.36                             | 4.77    | -11            |
| Mississippi-----   | 3-6             | 2-4     | 50                      | 30                | 66,300   | 24,800    | -63            | 6.23                             | 4.70    | -25            |
| Total-----         |                 |         |                         |                   | 1,045,700  | 738,400   | -29            | 5.57                             | 4.85    | -13            |
| Minnesota-----     | 4-8             | 2-4     | 40                      | 30                | 995,900  | 516,600   | -48            | 8.16                             | 5.89    | -28            |
| Michigan-----      | 4-8             | 2-4     | 40                      | 30                | 290,800  | 150,000   | -48            | 4.53                             | 2.95    | -35            |
| Illinois-----      | 4-8             | 2-4     | 40                      | 30                | 298,900  | 251,100   | -16            | 4.90                             | 4.76    | -3             |
| Arkansas-----      | 4-8             | 2-4     | 40                      | 30                | 420,100  | 86,300    | -79            | 11.30                            | 5.08    | -55            |
| Kentucky-----      | 4-8             | 2-4     | 40                      | 30                | 27,900   | 20,800    | -26            | 3.76                             | 4.03    | +7             |
| Tennessee-----     | 4-8             | 2-4     | 40                      | 30                | 91,700   | 52,500    | -43            | 4.73                             | 4.62    | -2             |
| Total-----         |                 |         |                         |                   | 2,125,300  | 1,077,300 | -49            | 6.83                             | 4.79    | -30            |
| Alabama-----       | 4-8             | 3-6     | 40                      | 20                | 38,700   | 16,200    | -58            | 4.73                             | 4.00    | -15            |
| Louisiana-----     | 4-8             | 3-6     | <sup>1</sup> 36-S       | 20                | 443,300  | 276,300   | -38            | 8.59                             | 7.69    | -10            |
| Indiana-----       | 3-6             | 2-4     | <sup>1</sup> 45-S       | <sup>1</sup> 27-S | 51,200   | 26,100    | -49            | 2.48                             | 1.86    | -25            |
| Ohio-----          | 3-6             | 2-4     | <sup>1</sup> 45-S       | 30                | 133,300  | 55,900    | -58            | 4.85                             | 2.96    | -39            |
| Flyway totals----- |                 |         |                         |                   | 3,838,000  | 2,190,000 | -43            | 6.32                             | 4.87    | -23            |

<sup>1</sup> Indicates split season.

TABLE A-9.--Activity of United States waterfowl hunters during the 1961-62 hunting season, with 1960-61 hunting season comparisons, Mississippi Flyway<sup>1</sup>

| State             | Daily duck bag and possession limit |           | Length of duck season (days) |                        | Total active hunters |                |                |
|-------------------|-------------------------------------|-----------|------------------------------|------------------------|----------------------|----------------|----------------|
|                   | 1960-61                             | 1961-62   | 1960-61                      | 1961-62                | 1960-61              | 1961-62        | Percent change |
| Wisconsin-----    | 3-6                                 | 2-4       | 50                           | 30                     | 95,950               | 78,950         | -18            |
| Iowa-----         | 3-6                                 | 2-4       | 50                           | 30                     | 40,470               | 34,770         | -14            |
| Missouri-----     | 3-6                                 | 2-4       | 50                           | 30                     | 40,600               | 33,170         | -18            |
| Mississippi-----  | 3-6                                 | 2-4       | 50                           | 30                     | 10,650               | 5,280          | -50            |
| Total-----        |                                     |           |                              |                        | 187,670              | 152,170        | -19            |
| Minnesota-----    | 4-8                                 | 2-4       | 40                           | 30                     | 122,060              | 87,770         | -28            |
| Michigan-----     | 4-8                                 | 2-4       | 40                           | 30                     | 64,220               | 50,810         | -21            |
| Illinois-----     | 4-8                                 | 2-4       | 40                           | 30                     | 61,020               | 52,780         | -14            |
| Arkansas-----     | 4-8                                 | 2-4       | 40                           | 30                     | 37,170               | 17,000         | -54            |
| Kentucky-----     | 4-8                                 | 2-4       | 40                           | 30                     | 7,430                | 5,160          | -31            |
| Tennessee-----    | 4-8                                 | 2-4       | 40                           | 30                     | 19,370               | 11,360         | -41            |
| Total-----        |                                     |           |                              |                        | 311,270              | 224,880        | -28            |
| Alabama-----      | 4-8                                 | 3-6       | 2 40                         | 20                     | 8,190                | 4,050          | -50            |
| Louisiana-----    | 4-8                                 | 3-6       | 2 36-S                       | 20                     | 51,620               | 35,940         | -30            |
| Indiana-----      | 3-6                                 | 2-4       | 2 45-S                       | 2 27-S                 | 20,610               | 14,020         | -32            |
| Ohio-----         | 3-6                                 | 2-4       | 45-S                         | 30                     | 27,460               | 18,860         | -31            |
| Flyway total----- |                                     |           |                              |                        | 606,810              | 449,930        | -26            |
| State             | Total hunter-days                   |           |                              | Days hunted per hunter |                      |                |                |
|                   | 1960-61                             | 1961-62   | Percent change               | 1960-61                | 1961-62              | Percent change |                |
| Wisconsin-----    | 753,600                             | 531,700   | -29                          | 7.85                   | 6.74                 | -14.2          |                |
| Iowa-----         | 327,600                             | 234,500   | -28                          | 8.10                   | 6.74                 | -16.7          |                |
| Missouri-----     | 243,600                             | 189,100   | -22                          | 6.00                   | 5.70                 | -5.0           |                |
| Mississippi-----  | 71,500                              | 26,600    | -63                          | 6.71                   | 5.04                 | -25.0          |                |
| Total-----        | 1,396,300                           | 981,900   | -30                          | 7.44                   | 6.45                 | -13.3          |                |
| Minnesota-----    | 709,800                             | 279,700   | -61                          | 5.82                   | 3.19                 | -45.2          |                |
| Michigan-----     | 372,800                             | 266,900   | -28                          | 5.81                   | 5.25                 | -9.5           |                |
| Illinois-----     | 377,100                             | 352,800   | -6                           | 6.18                   | 6.68                 | +8.2           |                |
| Arkansas-----     | 284,500                             | 94,700    | -67                          | 7.65                   | 5.57                 | -27.2          |                |
| Kentucky-----     | 44,800                              | 34,100    | -24                          | 6.03                   | 6.61                 | +9.6           |                |
| Tennessee-----    | 108,200                             | 67,900    | -37                          | 5.59                   | 5.98                 | +7.0           |                |
| Total-----        | 1,897,200                           | 1,096,100 | -42                          | 6.10                   | 4.87                 | -20.0          |                |
| Alabama-----      | 45,000                              | 18,600    | -59                          | 5.50                   | 4.59                 | -16.4          |                |
| Louisiana-----    | 320,000                             | 196,200   | -39                          | 6.20                   | 5.46                 | -11.9          |                |
| Indiana-----      | 117,300                             | 78,000    | -34                          | 5.69                   | 5.56                 | -2.2           |                |
| Ohio-----         | 196,400                             | 110,000   | -44                          | 7.15                   | 5.83                 | -18.5          |                |
| Flyway total----- | 3,972,200                           | 2,480,800 | -38                          | 6.55                   | 5.51                 | -15.8          |                |

<sup>1</sup> Estimates of hunter-days unadjusted for possible response bias.

<sup>2</sup> Indicates split season.

TABLE A-10. --Waterfowl kill in Atlantic Flyway, seasons 1960-61 and 1961-62<sup>1</sup>

| Species                       | 1960-61             | 1961-62              | Percent charged |
|-------------------------------|---------------------|----------------------|-----------------|
| Ducks:                        |                     |                      |                 |
| Dabblers:                     |                     |                      |                 |
| Pintail-----                  | 21,300              | 15,900               | -25             |
| Mallard-----                  | 116,200             | 98,800               | -15             |
| American widgeon-----         | 33,200              | 26,900               | -19             |
| Shoveler-----                 | 3,100               | 2,900                | -6              |
| Cadwall-----                  | 9,500               | 3,100                | -67             |
| Blue-winged teal-----         | 15,000              | 12,900               | -14             |
| Green-winged teal-----        | 65,000              | 46,400               | -29             |
| Black duck-----               | 250,500             | <sup>2</sup> 189,700 | -24             |
| Wood duck-----                | 98,800              | 115,300              | +17             |
| Mottled and Florida duck----- | 19,100              | 23,800               | +25             |
| Subtotal-----                 | 632,300             | 535,700              | -15             |
| Divers:                       |                     |                      |                 |
| Scaup-----                    | <sup>3</sup> 39,600 | <sup>4</sup> 41,400  | +5              |
| Canvasback-----               | --                  | 200                  | --              |
| Redhead-----                  | 800                 | 700                  | --              |
| Ring-necked duck-----         | 44,200              | 45,500               | +3              |
| Goldeneye-----                | 23,700              | 13,000               | -45             |
| Bufflehead-----               | 15,000              | 11,400               | -24             |
| Ruddy duck-----               | 3,100               | 2,100                | -32             |
| Subtotal-----                 | 126,400             | 114,300              | -24             |
| Miscellaneous:                |                     |                      |                 |
| Scooter-----                  | <sup>5</sup> 15,800 | 13,100               | -16             |
| Merganser-----                | 15,700              | <sup>6</sup> 8,700   | -45             |
| Other <sup>7</sup> -----      | 19,000              | 3,900                | --              |
| Subtotal-----                 | 50,500              | 25,700               | -49             |
| Total:                        |                     |                      |                 |
| Retrieved <sup>8</sup> -----  | 809,000             | 676,000              | -16             |
| Not retrieved-----            | 282,000             | 208,000              | -26             |
| Ducks killed-----             | 1,091,000           | 884,000              | -19             |
| Geese                         |                     |                      |                 |
| Retrieved-----                | 96,500              | 80,300               | -17             |
| Not retrieved-----            | 23,200              | 17,200               | -25             |
| Geese killed-----             | 119,700             | 97,500               | -19             |
| Coots                         |                     |                      |                 |
| Retrieved-----                | 26,500              | 25,800               | -3              |
| Not retrieved-----            | 27,400              | 13,400               | -51             |
| Coots killed-----             | 53,900              | 39,200               | -27             |

<sup>1</sup> Species composition derived from duck wing survey.<sup>2</sup> Includes 6,600 black-mallard cross.<sup>3</sup> Includes 9,500 lesser scaup.<sup>4</sup> Includes 26,900 lesser scaup.<sup>5</sup> Includes 3,100 common and red breasted mergansers.<sup>6</sup> Includes 600 common and red breasted mergansers.<sup>7</sup> Mostly oldsquaw and eiders.<sup>8</sup> Duck totals rounded to nearest thousand.

TABLE A-11.--State and flyway estimates of reported total duck bag and average duck bag per hunter, with respective percentage changes, for the 1961-62 and 1960-61 hunting seasons, Atlantic Flyway

| State                            | Daily bag limit |         | Length of season (days) |                   | Estimated total bag (unadjusted for response bias) |         |                | Reported seasonal bag per hunter |         |                |
|----------------------------------|-----------------|---------|-------------------------|-------------------|--|---------|----------------|----------------------------------|---------|----------------|
|                                  | 1960-61         | 1961-62 | 1960-61                 | 1961-62           | 1960-61  | 1961-62 | Percent change | 1960-61                          | 1961-62 | Percent change |
| Vermont-----                     | 3-6             | 3-6     | 50                      | 40                | 10,000   | 15,500  | +55            | 3.28                             | 5.42    | +65            |
| New Jersey-----                  | 3-6             | 3-6     | 50                      | 40                | 50,800   | 38,000  | -25            | 4.34                             | 3.67    | -15            |
| Rhode Island-----                | 3-6             | 3-6     | 50                      | 40                | 12,500   | 7,700   | -38            | 6.72                             | 5.17    | -23            |
| Delaware-----                    | 3-6             | 3-6     | 50                      | 40                | 30,500   | 28,100  | -8             | 5.18                             | 5.47    | +6             |
| Virginia-----                    | 3-6             | 3-6     | 50                      | 40                | 65,400   | 36,500  | -44            | 5.89                             | 4.28    | -27            |
| North Carolina-----              | 3-6             | 3-6     | 50                      | 40                | 75,900   | 50,700  | -33            | 4.80                             | 3.49    | -27            |
| <b>Total-----</b>                |                 |         |                         |                   | 245,100  | 176,500 | -28            | 4.96                             | 4.11    | -17            |
| West Virginia-----               | 3-6             | 3-6     | <sup>1</sup> 45-S       | <sup>1</sup> 36-S | 3,000  | 2,100   | -29            | 2.50                             | 2.33    | -7             |
| New Hampshire-----               | 3-6             | 2-4     | 50                      | 50                | 13,000   | 14,400  | +11            | 3.79                             | 3.84    | +1             |
| Pennsylvania-----                | 3-6             | 2-4     | 50                      | 50                | 54,000   | 52,200  | -3             | 2.45                             | 2.64    | +8             |
| Maryland-----                    | 3-6             | 2-4     | 50                      | 50                | 65,800   | 55,900  | -15            | 4.23                             | 3.81    | -10            |
| <b>Total-----</b>                |                 |         |                         |                   | 132,800  | 125,000 | -6             | 3.24                             | 3.27    | +1             |
| Maine-----                       | 3-6             | 2-4     | <sup>1</sup> 45-S       | <sup>1</sup> 45-S | 56,100   | 39,500  | -30            | 7.05                             | 6.91    | -2             |
| Massachusetts-----               | 3-6             | 2-4     | <sup>1</sup> 45-S       | <sup>1</sup> 45-S | 67,000   | 59,100  | -12            | 5.30                             | 4.94    | -7             |
| <b>Total-----</b>                |                 |         |                         |                   | 123,100  | 98,600  | -20            | 5.98                             | 5.58    | -7             |
| South Carolina-----              | 4-8             | 3-6     | 40                      | 40                | 46,700   | 41,900  | -10            | 5.61                             | 4.79    | -15            |
| Florida-----                     | 4-8             | 3-6     | 38                      | 40                | 119,300  | 127,300 | +7             | 6.68                             | 7.30    | +9             |
| <b>Total-----</b>                |                 |         |                         |                   | 166,000  | 169,200 | -2             | 6.34                             | 6.46    | +2             |
| New York (with Long Island)----- | 3-6             | 3-6     | 50                      | <sup>1</sup> 36-S | 211,100  | 175,800 | -17            | 4.86                             | 5.12    | +5             |
| Connecticut-----                 | 3-6             | 2-4     | 50                      | 40                | 27,700   | 15,400  | -44            | 4.32                             | 3.20    | -26            |
| Georgia-----                     | 4-8             | 2-4     | 40                      | 50                | 20,000   | 17,400  | -13            | 4.41                             | 3.99    | -10            |
| <b>Flyway total-----</b>         | --              | --      | --                      | --                | 929,000  | 780,000 | -16            | 4.82                             | 4.61    | -4             |

<sup>1</sup> Indicates split season.

TABLE A-12.--Activity of United States waterfowl hunters during the 1961-62 hunting season, with 1960-61 hunting season comparisons, Atlantic Flyway<sup>1</sup>

| State                            | Daily duck bag and possession limit |         | Length of duck season (days) |                   | Total active hunters |         |                |
|----------------------------------|-------------------------------------|---------|------------------------------|-------------------|----------------------|---------|----------------|
|                                  | 1960-61                             | 1961-62 | 1960-61                      | 1961-62           | 1960-61              | 1961-62 | Percent change |
| Vermont-----                     | 3-6                                 | 3-6     | 50                           | 40                | 3,050                | 2,860   | -6             |
| New Jersey-----                  | 3-6                                 | 3-6     | 50                           | 40                | 11,710               | 10,350  | -12            |
| Rhode Island-----                | 3-6                                 | 3-6     | 50                           | 40                | 1,860                | 1,490   | -20            |
| Delaware-----                    | 3-6                                 | 3-6     | 50                           | 40                | 5,890                | 5,140   | -13            |
| Virginia-----                    | 3-6                                 | 3-6     | 50                           | 40                | 11,100               | 8,530   | -23            |
| North Carolina-----              | 3-6                                 | 3-6     | 50                           | 40                | 15,810               | 14,530  | -8             |
| Total-----                       |                                     |         |                              |                   | 49,420               | 42,900  | -13            |
| West Virginia-----               | 3-6                                 | 3-6     | <sup>2</sup> 45-S            | <sup>2</sup> 36-S | 1,200                | 900     | -25            |
| New Hampshire-----               | 3-6                                 | 2-4     | 50                           | 50                | 3,430                | 3,750   | +9             |
| Pennsylvania-----                | 3-6                                 | 2-4     | 50                           | 50                | 22,060               | 19,740  | -10            |
| Maryland-----                    | 3-6                                 | 2-4     | 50                           | 50                | 15,560               | 14,690  | -6             |
| Total-----                       |                                     |         |                              |                   | 41,050               | 38,180  | -7             |
| Maine-----                       | 3-6                                 | 2-4     | <sup>2</sup> 45-S            | <sup>2</sup> 45-S | 7,960                | 5,720   | -28            |
| Massachusetts-----               | 3-6                                 | 2-4     | <sup>2</sup> 45-S            | <sup>2</sup> 45-S | 12,640               | 11,960  | -5             |
| Total-----                       |                                     |         |                              |                   | 20,600               | 17,680  | -14            |
| South Carolina-----              | 4-8                                 | 3-6     | 40                           | 40                | 8,330                | 8,740   | +5             |
| Florida-----                     | 4-8                                 | 3-6     | 38                           | 40                | 17,850               | 17,450  | -2             |
| Total-----                       |                                     |         |                              |                   | 26,180               | 26,190  | 0              |
| New York (with Long Island)----- | 3-6                                 | 3-6     | 50                           | <sup>2</sup> 36-S | 43,450               | 34,320  | -21            |
| Connecticut-----                 | 3-6                                 | 2-4     | <sup>2</sup> 45-S            | 50                | 6,410                | 4,810   | -25            |
| Georgia-----                     | 4-8                                 | 2-4     | 40                           | 50                | 4,540                | 4,360   | -4             |
| Flyway total-----                |                                     |         |                              |                   | 192,850              | 169,300 | -12            |

| State                            | Total hunter-days |           |                | Days hunted per hunter |         |                |
|----------------------------------|-------------------|-----------|----------------|------------------------|---------|----------------|
|                                  | 1960-61           | 1961-62   | Percent change | 1960-61                | 1961-62 | Percent change |
| Vermont-----                     | 20,400            | 18,400    | -10            | 6.69                   | 6.43    | -3.8           |
| New Jersey-----                  | 75,200            | 62,000    | -16            | 6.42                   | 5.99    | -6.7           |
| Rhode Island-----                | 14,400            | 12,700    | -12            | 7.74                   | 8.52    | +10.1          |
| Delaware-----                    | 48,800            | 42,400    | -1             | 7.27                   | 8.25    | +13.5          |
| Virginia-----                    | 61,900            | 44,900    | -27            | 5.58                   | 5.26    | -5.6           |
| North Carolina-----              | 88,500            | 72,600    | -18            | 5.60                   | 5.00    | -10.7          |
| Total-----                       | 303,200           | 253,000   | -17            | 6.14                   | 5.90    | -3.9           |
| West Virginia-----               | 5,100             | 4,800     | -6             | 4.25                   | 5.33    | +25.5          |
| New Hampshire-----               | 22,400            | 29,500    | +32            | 6.53                   | 7.87    | +20.5          |
| Pennsylvania-----                | 96,100            | 105,400   | +10            | 4.36                   | 5.34    | +22.6          |
| Maryland-----                    | 92,700            | 91,600    | -1             | 5.96                   | 6.24    | +4.7           |
| Total-----                       | 211,200           | 226,500   | +7             | 5.15                   | 5.93    | +15.3          |
| Maine-----                       | 47,300            | 28,800    | -39            | 5.94                   | 5.04    | -15.3          |
| Massachusetts-----               | 84,000            | 86,400    | +3             | 6.65                   | 7.22    | +8.7           |
| Total-----                       | 131,300           | 115,200   | -12            | 6.37                   | 6.52    | +2.2           |
| South Carolina-----              | 40,800            | 46,900    | +15            | 4.90                   | 5.37    | +9.6           |
| Florida-----                     | 89,600            | 94,800    | +6             | 5.02                   | 5.43    | +8.2           |
| Total-----                       | 130,400           | 141,700   | +9             | 4.98                   | 5.41    | +8.6           |
| New York (with Long Island)----- | 277,500           | 215,200   | -23            | 6.39                   | 6.27    | -1.8           |
| Connecticut-----                 | 35,200            | 29,000    | -18            | 5.49                   | 6.03    | +9.8           |
| Georgia-----                     | 20,600            | 19,700    | -4             | 4.54                   | 4.52    | -0.4           |
| Flyway total-----                | 1,114,500         | 1,005,100 | -10            | 5.78                   | 5.94    | +2.7           |

<sup>1</sup> Estimates of hunter-days unadjusted for possible response bias.

<sup>2</sup> Indicates split season.

TABLE A-13. -- Flyway-wide hunter averages of waterfowl kill, 1960-61 and 1961-62 hunting seasons

| Flyway           | Bag during season <sup>1</sup> |         |                | Number not retrieved during season |         |                | Daily bag <sup>1</sup> |         |                |
|------------------|--------------------------------|---------|----------------|------------------------------------|---------|----------------|------------------------|---------|----------------|
|                  | 1960-61                        | 1961-62 | Percent change | 1960-61                            | 1961-62 | Percent change | 1960-61                | 1961-62 | Percent change |
| <b>DUCKS</b>     |                                |         |                |                                    |         |                |                        |         |                |
| Atlantic-----    | 4.198                          | 3.990   | -5             | 1.463                              | 1.227   | -16            | 1.126                  | 1.040   | -8             |
| Mississippi----- | 4.907                          | 3.781   | -23            | 1.738                              | 1.232   | -29            | 1.230                  | 1.124   | -9             |
| Central-----     | 4.547                          | 3.707   | -18            | 1.525                              | 1.047   | -31            | 1.205                  | 1.038   | -14            |
| Pacific-----     | 9.111                          | 8.143   | -11            | 2.392                              | 1.871   | -22            | 2.182                  | 2.016   | -8             |
| <b>GEESE</b>     |                                |         |                |                                    |         |                |                        |         |                |
| Atlantic-----    | .501                           | .474    | -5             | .121                               | .101    | -17            | .134                   | .124    | -10            |
| Mississippi----- | .293                           | .369    | +26            | .107                               | .090    | -16            | .073                   | .110    | +51            |
| Central-----     | .696                           | .913    | +31            | .238                               | .200    | -16            | .185                   | .256    | +38            |
| Pacific-----     | 1.054                          | .830    | -21            | .358                               | .178    | -50            | .252                   | .205    | -19            |
| <b>COOTS</b>     |                                |         |                |                                    |         |                |                        |         |                |
| Atlantic-----    | .138                           | .152    | +10            | .142                               | .079    | -44            | .037                   | .040    | +8             |
| Mississippi----- | .322                           | .155    | -52            | .224                               | .074    | -67            | .081                   | .046    | -43            |
| Central-----     | .079                           | .060    | -24            | .105                               | .042    | -60            | .021                   | .017    | -19            |
| Pacific-----     | .241                           | .268    | +11            | .304                               | .232    | -24            | .058                   | .066    | +14            |

<sup>1</sup> Average based on bias-adjusted data.

## B. WING COLLECTION SURVEY

TABLE B-1.--Hunters contacted and wings received in wing collections, hunting seasons 1959-60, 1960-61 and 1961-62

| Flyway                     | Number of--       |         |         |                |         |         |
|----------------------------|-------------------|---------|---------|----------------|---------|---------|
|                            | Hunters contacted |         |         | Wings received |         |         |
|                            | 1959-60           | 1960-61 | 1961-62 | 1959-60        | 1960-61 | 1961-62 |
| Pacific-----               | --                | --      | 4,967   | --             | --      | 11,247  |
| Central <sup>1</sup> ----- | --                | --      | 6,785   | --             | --      | 8,712   |
| Mississippi-----           | 7,997             | 10,316  | 12,329  | 10,545         | 23,019  | 13,781  |
| Atlantic-----              | --                | 8,599   | 7,770   | --             | 13,306  | 9,504   |
| Total-----                 | 7,997             | 18,915  | 31,851  | 10,545         | 36,325  | 43,244  |

<sup>1</sup> Includes all Montana.

TABLE B-2.--Age ratios, by species, determined from wing collections, hunting seasons 1959-60, 1960-61 and 1961-62

| Species                | Number of--    |                |                    |        |       |                 |       |                     |                |                    |      |      |                 |      |      |
|------------------------|----------------|----------------|--------------------|--------|-------|-----------------|-------|---------------------|----------------|--------------------|------|------|-----------------|------|------|
|                        | Wings received |                |                    |        |       |                 |       | Immatures per adult |                |                    |      |      |                 |      |      |
|                        | Pacific Flyway | Central Flyway | Mississippi Flyway |        |       | Atlantic Flyway |       | Pacific Flyway      | Central Flyway | Mississippi Flyway |      |      | Atlantic Flyway | U.S. |      |
|                        | 1961           | 1961           | 1959               | 1960   | 1961  | 1960            | 1961  | 1961                | 1961           | 1959               | 1960 | 1961 | 1960            | 1961 |      |
| Mallard-----           | 3,692          | 4,909          | 4,592              | 12,470 | 6,348 | 1,610           | 1,224 | 1.22                | 0.69           | 0.77               | 1.76 | 1.08 | 2.46            | 1.97 | 1.05 |
| Black duck----         | --             | 10             | 455                | 1,275  | 693   | 4,996           | 2,947 | --                  | --             | 2.10               | 1.83 | 2.04 | 2.11            | 1.75 | 1.82 |
| Gadwall-----           | 249            | 245            | 197                | 434    | 321   | 94              | 34    | 1.23                | 1.06           | 1.39               | 3.64 | 1.04 | 3.65            | 1.36 | 1.12 |
| American widgeon-----  | 1,853          | 512            | 450                | 894    | 680   | 452             | 305   | 1.44                | 3.41           | 1.60               | 3.48 | 3.29 | 1.32            | 1.04 | 1.81 |
| Green-winged teal----- | 1,075          | 874            | 688                | 984    | 815   | 1,027           | 641   | .90                 | 2.69           | 1.95               | 3.41 | 2.66 | 2.57            | 1.74 | 1.55 |
| Blue-winged teal-----  | --             | 101            | 587                | 761    | 254   | 188             | 149   | --                  | 3.64           | 1.59               | 2.34 | 1.69 | 2.54            | 1.58 | 1.80 |
| Cinnamon teal-----     | 207            | --             | --                 | --     | --    | --              | --    | 1.87                | --             | --                 | --   | --   | --              | --   | 1.87 |
| Shoveler-----          | 735            | 172            | 75                 | 280    | 114   | 40              | 25    | 1.29                | 2.62           | 2.34               | 5.78 | 7.65 | 12.46           | 1.04 | 1.60 |
| Pintail-----           | 1,848          | 445            | 331                | 788    | 571   | 315             | 219   | .59                 | 1.25           | 1.12               | 1.95 | 1.52 | 1.93            | 1.05 | .76  |
| Wood duck-----         | 77             | 48             | 411                | 1,044  | 820   | 1,275           | 1,400 | 2.43                | .77            | 1.45               | 2.06 | 2.11 | 2.10            | 1.66 | 1.83 |
| Greater scaup-----     | 31             | 9              | 121                | 181    | 88    | 493             | 206   | 1.81                | .82            | 2.20               | 2.30 | 1.47 | 2.45            | .79  | 1.12 |
| Lesser scaup-----      | 118            | 402            | 1,010              | 541    | 989   | 127             | 260   | 4.20                | 2.87           | 1.17               | 2.21 | 1.83 | 1.67            | 2.38 | 2.19 |
| Ring-necked duck-----  | 62             | 85             | 507                | 877    | 527   | 405             | 353   | 1.78                | 1.70           | 1.47               | 2.91 | 3.77 | 2.10            | 1.23 | 2.30 |
| Goldeneye-----         | 88             | 35             | 90                 | 99     | 44    | 436             | 201   | .83                 | 6.51           | 2.13               | 1.87 | 1.94 | 1.17            | .83  | 1.87 |

Note.--In estimating Flyway and United States ratios, the ratio for each State was weighted in proportion to the estimated size of the total duck kill in the State.

TABLE B-3. --Age ratios of mallards determined from wing collections, hunting seasons 1959-60,  
1960-61 and 1961-62

| Location of kill               | Number of--    |         |         |                                  |         |                  |
|--------------------------------|----------------|---------|---------|----------------------------------|---------|------------------|
|                                | Wings received |         |         | Immatures per adult <sup>1</sup> |         |                  |
|                                | 1959-60        | 1960-61 | 1961-62 | 1959-60                          | 1960-61 | 1961-62          |
| Pacific Flyway:                |                |         |         |                                  |         |                  |
| Washington-----                | --             | --      | 1,259   | --                               | --      | 1.1              |
| Oregon-----                    | --             | --      | 656     | --                               | --      | 1.8              |
| Idaho-----                     | --             | --      | 715     | --                               | --      | .9               |
| Montana <sup>2</sup> -----     | --             | --      | 464     | --                               | --      | 1.2              |
| California-----                | --             | --      | 679     | --                               | --      | 1.5              |
| Nevada-----                    | --             | --      | 149     | --                               | --      | 1.7              |
| Utah-----                      | --             | --      | 217     | --                               | --      | 2.0              |
| Arizona-----                   | --             | --      | 17      | --                               | --      | ( <sup>3</sup> ) |
| Flyway-----                    | --             | --      | --      | --                               | --      | 1.22             |
| Central Flyway:                |                |         |         |                                  |         |                  |
| Montana <sup>2</sup> -----     | --             | --      | 620     | --                               | --      | 1.2              |
| North Dakota-----              | --             | --      | 531     | --                               | --      | 1.1              |
| South Dakota-----              | --             | --      | 145     | --                               | --      | .5               |
| Wyoming-----                   | --             | --      | 79      | --                               | --      | 1.3              |
| Nebraska-----                  | --             | --      | 1,210   | --                               | --      | .5               |
| Colorado-----                  | --             | --      | 943     | --                               | --      | .5               |
| Kansas-----                    | --             | --      | 509     | --                               | --      | .6               |
| New Mexico-----                | --             | --      | 140     | --                               | --      | .8               |
| Oklahoma-----                  | --             | --      | 129     | --                               | --      | .7               |
| Texas-----                     | --             | --      | 139     | --                               | --      | .6               |
| Flyway-----                    | --             | --      | --      | --                               | --      | .69              |
| Mississippi Flyway:            |                |         |         |                                  |         |                  |
| Minnesota-----                 | 1,102          | 1,044   | 768     | 1.2                              | 3.0     | 1.5              |
| Wisconsin-----                 | 344            | 1,021   | 772     | 2.1                              | 3.3     | 2.0              |
| Michigan-----                  | 153            | 427     | 450     | 2.6                              | 4.1     | 3.0              |
| Iowa-----                      | 182            | 536     | 560     | 0.5                              | 1.8     | 1.0              |
| Illinois-----                  | 817            | 1,249   | 1,007   | 0.6                              | 1.3     | 0.8              |
| Indiana-----                   | 32             | 524     | 210     | 1.5                              | 0.9     | 0.8              |
| Ohio-----                      | 130            | 354     | 197     | 1.6                              | 2.7     | 2.5              |
| Missouri-----                  | 539            | 1,301   | 597     | 0.5                              | 1.3     | 1.0              |
| Kentucky-----                  | 11             | 574     | 373     | --                               | 0.8     | 0.7              |
| Arkansas-----                  | 901            | 2,787   | 512     | 0.5                              | 1.3     | 0.5              |
| Tennessee-----                 | 182            | 1,181   | 503     | 0.5                              | 1.1     | 0.6              |
| Louisiana-----                 | 140            | 719     | 216     | 0.6                              | 1.3     | 0.3              |
| Mississippi-----               | 42             | 479     | 135     | 0.6                              | 0.9     | 0.6              |
| Alabama-----                   | 17             | 274     | 48      | --                               | 2.9     | 0.7              |
| Flyway-----                    | --             | --      | --      | 0.77                             | 1.76    | 1.05             |
| Atlantic Flyway:               |                |         |         |                                  |         |                  |
| Maine-----                     | --             | 34      | 10      | --                               | 4.7     | --               |
| Vermont-----                   | --             | 55      | 44      | --                               | 4.9     | 3.0              |
| New Hampshire-----             | --             | 10      | 11      | --                               | --      | --               |
| Massachusetts-----             | --             | 96      | 42      | --                               | 2.6     | 3.2              |
| Connecticut-----               | --             | 52      | 65      | --                               | 4.2     | 4.0              |
| Rhode Island-----              | --             | 9       | 22      | --                               | --      | 3.4              |
| New York-----                  | --             | 280     | 343     | --                               | 5.0     | 3.8              |
| Pennsylvania-----              | --             | 190     | 124     | --                               | 4.1     | 2.9              |
| West Virginia-----             | --             | 36      | 20      | --                               | 1.1     | 1.2              |
| New Jersey-----                | --             | 215     | 147     | --                               | 2.2     | 1.3              |
| Delaware-----                  | --             | 58      | 54      | --                               | 1.4     | 1.1              |
| Maryland-----                  | --             | 172     | 66      | --                               | 1.6     | 1.4              |
| Virginia-----                  | --             | 117     | 105     | --                               | 1.8     | 0.8              |
| North Carolina-----            | --             | 148     | 48      | --                               | 1.3     | 0.9              |
| South Carolina-----            | --             | 108     | 101     | --                               | 1.4     | 0.6              |
| Georgia-----                   | --             | 6       | 1       | --                               | --      | --               |
| Florida-----                   | --             | 24      | 21      | --                               | 2.4     | 2.5              |
| Flyway-----                    | --             | --      | --      | --                               | 2.46    | 1.97             |
| Continental United States----- | --             | --      | --      | --                               | --      | 1.05             |

<sup>1</sup> In estimating Flyway and United States ratios, the ratio for each State was weighted in proportion to the estimated size of the mallard kill in the State.

<sup>2</sup> Montana counties west of the Continental Divide are included in the Pacific Flyway. Those east of this line are included in the Central Flyway.

<sup>3</sup> Age ratio not shown if based on less than 20 wings.

TABLE B-4.--Age ratios of mallard and pintail determined from supplemental wing collections, hunting seasons 1959-60, 1960-61 and 1961-62

| Location of kill       | Number of--    |                    |         |                     |         |         |
|------------------------|----------------|--------------------|---------|---------------------|---------|---------|
|                        | Wings received |                    |         | Immatures per adult |         |         |
|                        | 1959-60        | 1960-61            | 1961-62 | 1959-60             | 1960-61 | 1961-62 |
| <b>MALLARD</b>         |                |                    |         |                     |         |         |
| Pacific Flyway:        |                |                    |         |                     |         |         |
| Columbia Refuge, Wash. | --             | 154                | 479     | --                  | 1.7     | 0.8     |
| Skagit Delta, Wash.    | --             | 615                | 416     | --                  | 3.3     | 3.7     |
| Cold Springs, Oreg.    | --             | --                 | 402     | --                  | --      | 0.6     |
| Sauvie Island, Oreg.   | --             | 633                | 1,146   | --                  | 2.4     | 1.6     |
| Boise-Nampa, Idaho     | 89             | <sup>1</sup> 1,285 | 834     | 1.6                 | 1.3     | .8      |
| Klamath Basin, Calif.  | --             | --                 | 48      | --                  | --      | 1.9     |
| Tule Lake, Calif.      | 313            | 113                | 809     | .4                  | 1.0     | 1.7     |
| Merced, Calif.         | 573            | 737                | 182     | 2.6                 | 2.8     | 1.9     |
| Colusa-Sutter, Calif.  | 1,303          | 1,218              | 1,741   | 1.6                 | 2.0     | 2.0     |
| Bear River, Utah       | 140            | 161                | --      | .4                  | 1.1     | --      |
| Central Flyway:        |                |                    |         |                     |         |         |
| Lower Souris, N. Dak.  | 21             | 488                | --      | .8                  | 1.7     | --      |
| Jamestown, N. Dak.     | --             | 81                 | --      | --                  | 1.5     | --      |
| Minot, N. Dak.         | --             | 139                | --      | --                  | 1.9     | --      |
| Mississippi Flyway:    |                |                    |         |                     |         |         |
| Stuttgart, Ark.        | 867            | 430                | --      | 0.3                 | 1.2     | --      |
| Atlantic Flyway:       |                |                    |         |                     |         |         |
| Georgetown, S. C.      | 69             | 134                | 95      | 1.2                 | 1.8     | 1.4     |
| <b>PINTAIL</b>         |                |                    |         |                     |         |         |
| Pacific Flyway:        |                |                    |         |                     |         |         |
| Bear River, Utah       | 273            | 232                | --      | 0.2                 | 0.7     | --      |
| Tule Lake, Calif.      | 131            | 259                | 647     | 0.3                 | 1.8     | 0.7     |
| Colusa-Sutter, Calif.  | 1,259          | 1,422              | 1,009   | 0.5                 | 1.5     | 0.5     |
| Merced, Calif.         | --             | 414                | 81      | --                  | 1.4     | 0.4     |
| Sauvie Island, Oreg.   | --             | --                 | 680     | --                  | --      | 1.4     |

<sup>1</sup> 1960 collection includes 1,098 wings from Idaho Game Department, collected in the Boise Valley, Idaho.

TABLE B-5.--Percentage species composition by Flyways determined from wing collections, 1959, 1960 and 1961<sup>1</sup>

| Species                           | Pacific Flyway | Central Flyway | Mississippi Flyway |        |        | Atlantic Flyway |       | U. S.  |
|-----------------------------------|----------------|----------------|--------------------|--------|--------|-----------------|-------|--------|
|                                   | 1961           | 1961           | 1959               | 1960   | 1961   | 1960            | 1961  | 1961   |
| Mallard-----                      | 34.2           | 54.1           | 46.6               | 53.0   | 48.9   | 14.3            | 14.6  | 40.3   |
| Mallard (domestic)---             | Trace          | Trace          | --                 | Trace  | Trace  | .4              | .3    | Trace  |
| Mallard x black-----              | Trace          | Trace          | .3                 | .2     | .2     | .8              | 1.0   | .2     |
| Black duck-----                   | --             | .2             | 4.6                | 4.3    | 3.4    | 30.7            | 27.1  | 4.9    |
| Mottled duck-----                 | --             | 1.7            | --                 | .4     | 1.0    | 2.1             | 3.5   | 1.1    |
| Gadwall-----                      | 2.0            | 3.3            | 1.9                | 1.9    | 2.3    | 1.2             | .5    | 2.1    |
| American widgeon-----             | 17.2           | 6.6            | 4.2                | 4.7    | 5.7    | 4.3             | 4.0   | 9.7    |
| Green-winged teal-----            | 12.4           | 12.6           | 7.6                | 5.9    | 8.2    | 8.3             | 6.9   | 10.3   |
| Blue-winged or cinnamon teal----- | 2.0            | 1.1            | 5.4                | 5.5    | 2.6    | 1.9             | 1.9   | 1.9    |
| Shoveler-----                     | 7.4            | 2.8            | .9                 | 1.6    | 1.0    | .4              | .4    | 3.5    |
| Pintail-----                      | 18.4           | 6.3            | 3.4                | 4.2    | 4.6    | 2.7             | 2.4   | 9.5    |
| Wood duck-----                    | .7             | 1.0            | 4.0                | 4.8    | 6.1    | 12.5            | 17.1  | 4.6    |
| Redhead-----                      | .2             | .4             | 1.2                | .2     | .1     | .1              | Trace | .2     |
| Canvasback-----                   | .1             | Trace          | .7                 | Trace  | Trace  | --              | Trace | Trace  |
| Greater scaup-----                | .3             | .2             | 1.4                | .9     | .5     | 3.8             | 2.1   | .6     |
| Lesser scaup-----                 | 1.2            | 6.6            | 9.2                | 3.4    | 8.9    | 1.2             | 4.0   | 5.2    |
| Ring-necked duck-----             | .6             | 1.7            | 4.7                | 6.5    | 4.4    | 5.7             | 6.7   | 2.8    |
| Common goldeneye-----             | .9             | .3             | .9                 | .5     | .3     | 2.9             | 1.9   | .7     |
| Barrow's goldeneye-----           | Trace          | --             | --                 | --     | --     | --              | --    | --     |
| Bufflehead-----                   | 1.0            | .4             | 1.4                | .7     | 1.0    | 1.9             | 1.7   | 1.0    |
| Ruddy duck-----                   | 1.2            | .2             | .2                 | .6     | .2     | .4              | .3    | .6     |
| Common merganser-----             | Trace          | Trace          | Trace              | Trace  | Trace  | .2              | .1    | Trace  |
| Red-br. merganser-----            | .1             | Trace          | .2                 | .2     | .1     | .6              | --    | .1     |
| Hooded merganser-----             | .1             | .1             | .6                 | .3     | .5     | 1.3             | 1.2   | .4     |
| Oldsquaw-----                     | Trace          | --             | Trace              | Trace  | .1     | .7              | --    | Trace  |
| Common eider-----                 | --             | --             | --                 | Trace  | --     | .1              | .1    | Trace  |
| Common scoter-----                | --             | --             | .1                 | Trace  | --     | .2              | .1    | Trace  |
| W.-winged scoter-----             | .1             | Trace          | .1                 | --     | Trace  | .9              | 1.7   | .1     |
| Surf scoter-----                  | .1             | --             | --                 | .1     | --     | .3              | .1    | .3     |
| Fulvous tree duck-----            | Trace          | --             | --                 | --     | --     | Trace           | .1    | Trace  |
| Unidentifiable-----               | Trace          | .3             | .2                 | .1     | Trace  | Trace           | .2    | .1     |
| Total-----                        | 100.2          | 99.9           | 99.8               | 100.1  | 99.9   | 99.9            | 100.0 | 100.2  |
| Sample size-----                  | 11,247         | 8,712          | 10,545             | 23,019 | 13,781 | 13,306          | 9,504 | 43,244 |

<sup>1</sup> In estimating Flyway and United States species composition, the species composition for each State was weighted in proportion to the estimated size of the total duck kill in that State.

TABLE B-6. --Age ratios of black ducks determined from wing collections, hunting seasons 1959-60,  
1960-61 and 1961-62

| Location of kill                      | Number of--    |           |           |                                  |             |                  |
|---------------------------------------|----------------|-----------|-----------|----------------------------------|-------------|------------------|
|                                       | Wings received |           |           | Immatures per adult <sup>1</sup> |             |                  |
|                                       | 1959-60        | 1960-61   | 1961-62   | 1959-60                          | 1960-61     | 1961-62          |
| <b>Mississippi Flyway:</b>            |                |           |           |                                  |             |                  |
| Minnesota-----                        | 99             | 50        | 8         | 3.3                              | 2.3         | ( <sup>2</sup> ) |
| Wisconsin-----                        | 77             | 114       | 89        | 3.0                              | 3.4         | 3.5              |
| Michigan-----                         | 109            | 216       | 200       | 2.1                              | 2.0         | 2.5              |
| Iowa-----                             | 3              | 8         | 3         | --                               | --          | --               |
| Illinois-----                         | 44             | 30        | 52        | 1.8                              | 2.0         | 1.4              |
| Indiana-----                          | 6              | 141       | 55        | --                               | 1.2         | 1.1              |
| Ohio-----                             | 52             | 207       | 62        | 2.1                              | 1.2         | 1.5              |
| Missouri-----                         | 5              | 14        | 4         | --                               | --          | --               |
| Kentucky-----                         | 5              | 141       | 126       | --                               | 1.1         | 1.0              |
| Arkansas-----                         | 11             | 27        | 8         | --                               | 2.0         | --               |
| Tennessee-----                        | 34             | 241       | 67        | 1.0                              | 1.3         | 1.0              |
| Louisiana-----                        | 4              | 13        | 3         | --                               | --          | --               |
| Mississippi-----                      | 2              | 32        | 7         | --                               | 2.6         | --               |
| Alabama-----                          | 4              | 41        | 9         | --                               | 1.9         | --               |
| <b>Flyway-----</b>                    | <b>--</b>      | <b>--</b> | <b>--</b> | <b>1.53</b>                      | <b>1.83</b> | <b>2.09</b>      |
| <b>Atlantic Flyway:</b>               |                |           |           |                                  |             |                  |
| Maine-----                            | --             | 878       | 379       | --                               | 3.0         | 1.8              |
| Vermont-----                          | --             | 233       | 186       | --                               | 5.5         | 3.8              |
| New Hampshire-----                    | --             | 71        | 72        | --                               | 4.9         | 3.5              |
| Massachusetts-----                    | --             | 636       | 329       | --                               | 2.2         | 1.8              |
| Connecticut-----                      | --             | 183       | 122       | --                               | 2.4         | 2.1              |
| Rhode Island-----                     | --             | 159       | 93        | --                               | 1.9         | 1.0              |
| New York-----                         | --             | 435       | 418       | --                               | 2.7         | 2.3              |
| Pennsylvania-----                     | --             | 163       | 73        | --                               | 3.0         | .6               |
| West Virginia-----                    | --             | 66        | 26        | --                               | .6          | .9               |
| New Jersey-----                       | --             | 1,132     | 712       | --                               | 1.9         | 1.6              |
| Delaware-----                         | --             | 200       | 122       | --                               | 1.2         | 2.0              |
| Maryland-----                         | --             | 378       | 131       | --                               | 1.4         | 2.2              |
| Virginia-----                         | --             | 161       | 148       | --                               | 1.6         | 1.1              |
| North Carolina-----                   | --             | 228       | 59        | --                               | 1.5         | 1.7              |
| South Carolina-----                   | --             | 46        | 53        | --                               | 1.6         | 1.0              |
| Georgia-----                          | --             | 2         | --        | --                               | --          | --               |
| Florida-----                          | --             | 25        | 24        | --                               | 4.0         | 3.0              |
| <b>Flyway-----</b>                    | <b>--</b>      | <b>--</b> | <b>--</b> | <b>--</b>                        | <b>2.11</b> | <b>1.75</b>      |
| <b>Continental United States-----</b> | <b>--</b>      | <b>--</b> | <b>--</b> | <b>--</b>                        | <b>2.00</b> | <b>1.82</b>      |

<sup>1</sup> In estimating Flyway and United States ratios, the ratio for each State was weighted in proportion to the estimated size of the black duck kill in the State.

<sup>2</sup> Age ratio not shown if based on less than twenty wings.

## C. WINTER SURVEY TABLES AND CHARTS

TABLE C-1.--Participation in winter survey, 1962

| Location                | Number of observers |              |           |              | Aerial coverage  |              |               | Nonaerial miles traveled |
|-------------------------|---------------------|--------------|-----------|--------------|------------------|--------------|---------------|--------------------------|
|                         | United States       | State        | Other     | Total        | Number of Planes | Hours flown  | Miles flown   |                          |
| <b>United States:</b>   |                     |              |           |              |                  |              |               |                          |
| Pacific Flyway-----     | 37                  | 317          | 4         | 358          | 35               | 193.5        | 18,500        | 24,942                   |
| Central Flyway-----     | 61                  | 239          | 9         | 309          | 33               | 203.3        | 23,425        | 22,195                   |
| Mississippi Flyway----- | 103                 | 612          | 25        | 740          | 50               | 236.0        | 21,345        | 40,638                   |
| Atlantic Flyway-----    | 45                  | 131          | 15        | 191          | 29               | 245.4        | 22,920        | 3,913                    |
| Alaska-----             | 2                   | --           | 1         | 3            | 1                | 2.0          | 260           | --                       |
| <b>Total-----</b>       | <b>248</b>          | <b>1,299</b> | <b>54</b> | <b>1,601</b> | <b>148</b>       | <b>880.2</b> | <b>86,450</b> | <b>91,688</b>            |
| Canada-----             | --                  | --           | 29        | 29           | 2                | --           | --            | --                       |
| Mexico-----             | 5                   | --           | --        | 5            | 2                | 115.0        | 6,085         | --                       |
| <b>Grand total-----</b> | <b>253</b>          | <b>1,299</b> | <b>83</b> | <b>1,635</b> | <b>152</b>       | <b>995.2</b> | <b>92,535</b> | <b>91,723</b>            |

TABLE C-2.--Number of birds, by species, Pacific Flyway extended, winter survey, 1961 and 1962<sup>1</sup>

| Species                             | 1961                 |         | 1962                 |         | Percent change |
|-------------------------------------|----------------------|---------|----------------------|---------|----------------|
|                                     | Number               | Percent | Number               | Percent |                |
| Ducks:                              |                      |         |                      |         |                |
| Dabblers:                           |                      |         |                      |         |                |
| Pintail-----                        | 2,711,467            | 26.9    | 2,476,439            | 26.2    | -8             |
| Mallard-----                        | 2,147,752            | 21.3    | 2,040,355            | 21.5    | -5             |
| American widgeon-----               | 1,240,709            | 12.3    | 1,078,653            | 11.4    | -13            |
| Shoveler-----                       | 402,470              | 4.0     | 338,729              | 3.5     | -16            |
| Gadwall-----                        | 47,796               | .5      | 57,366               | 0.7     | +20            |
| Blue-winged teal-----               | 60,724               | .6      | 67,197               | 0.9     | +10            |
| Green-winged teal-----              | 397,746              | 4.0     | 485,318              | 5.2     | +22            |
| Wood duck-----                      | 1,609                | Trace   | 9,782                | 0.2     | --             |
| Subtotal-----                       | 7,010,273            | 69.6    | 6,553,839            | 69.6    | -7             |
| Divers:                             |                      |         |                      |         |                |
| Scaup-----                          | 203,166              | 2.0     | 288,012              | 3.0     | +41            |
| Canvasback-----                     | 57,291               | .6      | 44,934               | 0.5     | -22            |
| Redhead-----                        | 43,499               | .4      | 19,090               | 0.3     | -57            |
| Ring-necked duck-----               | 5,209                | .1      | 7,047                | Trace   | +35            |
| Goldeneye-----                      | 43,450               | .4      | 45,246               | 0.5     | +4             |
| Bufflehead-----                     | 33,531               | .3      | 31,412               | 0.4     | -7             |
| Ruddy duck-----                     | 97,320               | 1.0     | 129,077              | 1.4     | +32            |
| Subtotal-----                       | 483,466              | 4.8     | 564,818              | 6.1     | +17            |
| Miscellaneous:                      |                      |         |                      |         |                |
| Scoter and eider-----               | 89,699               | .9      | 113,713              | 1.2     | +26            |
| Oldsquaw-----                       | 347                  | Trace   | 227                  | Trace   | --             |
| Merganser-----                      | 33,851               | .3      | 20,104               | 0.3     | -41            |
| Subtotal-----                       | 123,897              | 1.2     | 134,044              | 1.5     | +8             |
| Total ducks-----                    | 7,617,636            | 75.6    | 7,252,701            | 77.2    | -5             |
| Geese:                              |                      |         |                      |         |                |
| Canada goose-----                   | 284,299              | 2.8     | 263,776              | 2.8     | -8             |
| Snow goose-----                     | 460,922              | 4.6     | 541,015              | 5.7     | +17            |
| White-fronted goose-----            | 185,596              | 1.8     | 199,545              | 2.2     | +7             |
| Ross's goose-----                   | 2,637                | Trace   | 27,920               | 0.3     | +958           |
| Cackling goose-----                 | 165,929              | 1.6     | 190,778              | 2.1     | +14            |
| Total geese-----                    | 1,099,383            | 10.8    | 1,223,034            | 13.1    | +11            |
| Black brant-----                    | 174,770              | 1.7     | 170,286              | 1.9     | -3             |
| Swan:                               |                      |         |                      |         |                |
| Whistling swan-----                 | 41,184               | .4      | 32,935               | 0.4     | -21            |
| Trumpeter swan-----                 | 325                  | Trace   | 428                  | Trace   | +31            |
| Total swan-----                     | 41,509               | .4      | 33,363               | 0.4     | -20            |
| Coot-----                           | 1,157,653            | 11.5    | 702,640              | 7.4     | -39            |
| All species:                        |                      |         |                      |         |                |
| Total identified-----               | 10,090,951           | 100.0   | 9,382,024            | 100.0   | -7             |
| Miscellaneous and unidentified----- | <sup>2</sup> 160,055 |         | <sup>3</sup> 112,682 |         |                |
| Grand total-----                    | 10,251,006           |         | 9,494,706            |         | -7             |

<sup>1</sup> Based on comparable coverage in 1961 and observed ducks (unadjusted for comparable coverage) in 1962.<sup>2</sup> Includes 13,943 cinnamon teal and 31,685 tree ducks, in addition to unidentified species.<sup>3</sup> Includes (5,619) cinnamon teal, and 25,398 tree ducks in addition to unidentified.

TABLE C-3. --Distribution of wintering waterfowl, Pacific Flyway extended, 1957-62

[ Index numbers ]

| Area                    | 1957                | 1958       | 1959       | 1960      | 1961       | 1962 <sup>2</sup> |
|-------------------------|---------------------|------------|------------|-----------|------------|-------------------|
| Alaska-----             | 29,120              | 30,051     | 31,941     | 15,420    | 24,194     | 4,845             |
| British Columbia-----   | 29,748              | 81,776     | 56,364     | 63,903    | 153,980    | 136,440           |
| Washington-----         | 757,324             | 1,087,444  | 1,123,077  | 1,225,126 | 1,291,347  | 1,307,788         |
| Oregon-----             | 711,811             | 638,463    | 998,266    | 1,018,989 | 1,034,976  | 730,011           |
| California-----         | 5,177,984           | 6,681,382  | 6,326,609  | 5,072,667 | 5,396,143  | 4,814,599         |
| Idaho-----              | 392,140             | 434,274    | 705,764    | 578,351   | 553,390    | 550,015           |
| Nevada-----             | 57,298              | 99,976     | 204,688    | 58,998    | 54,782     | 51,081            |
| Utah-----               | 98,040              | 158,740    | 101,703    | 39,895    | 68,307     | 42,716            |
| Arizona-----            | 80,561              | 46,960     | 67,221     | 64,292    | 54,877     | 55,366            |
| Mexico: West coast----- | <sup>1</sup> 81,435 | 1,139,797  | 1,870,730  | 1,531,207 | 1,623,317  | 1,801,845         |
| Total-----              | 7,435,461           | 10,398,863 | 11,486,453 | 9,668,848 | 10,255,313 | 9,494,706         |
| Comparable coverage:    |                     |            |            |           |            |                   |
| 1956-1957-----          | 7,427,176           | --         | --         | --        | --         | --                |
| 1957-1958-----          | 7,435,176           | 9,330,371  | --         | --        | --         | --                |
| 1958-1959-----          | --                  | 10,398,863 | 11,486,453 | --        | --         | --                |
| 1959-1960-----          | --                  | --         | 11,478,654 | 9,637,563 | --         | --                |
| 1960-1961-----          | --                  | --         | --         | 9,668,848 | 10,251,006 | --                |

<sup>1</sup> Baja California only.<sup>2</sup> Winter survey figures are based upon observed waterfowl and have not been adjusted for comparable coverage.

TABLE C-4. --Trend in waterfowl numbers, Pacific Flyway extended, winter survey, 1949-62

[ In thousands ]

| Year      | Ducks | Geese              | Brant | Swan | Coot  | Total  |
|-----------|-------|--------------------|-------|------|-------|--------|
| 1949----- | 9,008 | 980                | 123   | 17   | 773   | 10,901 |
| 1950----- | 7,082 | 730                | 144   | 18   | 407   | 8,381  |
| 1951----- | 6,619 | <sup>1</sup> 1,000 | 151   | 33   | 769   | 8,572  |
| 1952----- | 6,646 | 917                | 167   | 20   | 520   | 8,270  |
| 1953----- | 7,352 | 952                | 154   | 29   | 796   | 9,283  |
| 1954----- | 7,813 | 884                | 132   | 28   | 1,169 | 10,026 |
| 1955----- | 7,288 | 872                | 135   | 36   | 717   | 9,048  |
| 1956----- | 7,929 | 961                | 110   | 48   | 885   | 9,933  |
| 1957----- | 6,593 | 749                | 128   | 44   | 952   | 8,466  |
| 1958----- | 8,582 | 800                | 126   | 51   | 815   | 10,394 |
| 1959----- | 9,452 | 918                | 68    | 40   | 1,007 | 11,485 |
| 1960----- | 7,760 | 883                | 105   | 36   | 859   | 9,643  |
| 1961----- | 7,780 | 1,100              | 134   | 41   | 1,162 | 10,217 |
| 1962----- | 7,365 | 1,223              | 170   | 34   | 703   | 9,495  |

Note.--Coverage during the period was not comparable and the data were adjusted, using 1959 and 1955 as base years. It was assumed that areas where comparable surveys were conducted provided an accurate measure of the percentage change between 2 consecutive years. On this basis, population estimates were calculated backward and forward from the base years. The 1962 figures are based upon only observed birds and are not adjusted.

<sup>1</sup> Index arbitrarily reduced from 1,797,000 to 1 million geese. During January 1951, more geese were estimated to be in Merced County, California, than were in the entire flyway either the previous or the following year. It seems certain that the estimate was in error. If the geese recorded in Merced County are deleted from the totals for 1950, 1951, and 1952, and a revised estimate is calculated based on change observed in the remaining areas, the index for 1951 is about 1 million birds.

<sup>2</sup> No surveys were conducted in Mexico in 1957. The data indicate that it is unlikely that surveys in the United States, Canada, and Alaska accurately revealed the trend in wintering populations of ducks that year.

TABLE C-5.--Number of birds, by species, Central Flyway extended, winter survey, 1961 and 1962

| Species                             | 1961 <sup>1</sup> |         | 1962 <sup>1</sup> |         | Percent change |
|-------------------------------------|-------------------|---------|-------------------|---------|----------------|
|                                     | Number            | Percent | Number            | Percent |                |
| Ducks:                              |                   |         |                   |         |                |
| Dabblers:                           |                   |         |                   |         |                |
| Pintail-----                        | 949,649           | 16.8    | 586,231           | 13.2    | -39            |
| Mallard-----                        | 1,698,231         | 30.1    | 1,467,356         | 33.0    | -13            |
| American widgeon-----               | 341,313           | 6.0     | 223,231           | 5.0     | -35            |
| Shoveler-----                       | 93,134            | 1.6     | 65,488            | 1.5     | -30            |
| Gadwall-----                        | 86,018            | 1.5     | 43,700            | 1.0     | -50            |
| Blue-winged teal-----               | 198,897           | 3.5     | 123,263           | 3.0     | -39            |
| Green-winged teal-----              | 215,572           | 3.8     | 98,134            | 2.2     | -55            |
| Tree duck-----                      | 2,843             | .1      | 24,354            | .5      | +756           |
| Mottled duck-----                   | 8,950             | .2      | 3,162             | Trace   | -65            |
| Wood duck-----                      | 1,353             | Trace   | 3,034             | Trace   | +124           |
| Subtotal-----                       | 3,595,960         | 63.6    | 2,637,953         | 59.4    | -27            |
| Divers:                             |                   |         |                   |         |                |
| Scaup-----                          | 89,183            | 1.6     | 251,632           | 6.0     | +180           |
| Canvasback-----                     | 15,433            | .3      | 8,647             | .2      | -44            |
| Redhead-----                        | 614,412           | 10.9    | 347,905           | 8.0     | -44            |
| Ring-necked duck-----               | 2,018             | Trace   | 4,423             | .1      | +119           |
| Goldeneye-----                      | 18,273            | .3      | 14,966            | .3      | -19            |
| Bufflehead-----                     | 1,411             | Trace   | 1,481             | Trace   | +4             |
| Ruddy duck-----                     | 10,349            | .2      | 3,123             | Trace   | -70            |
| Subtotal-----                       | 751,079           | 13.3    | 632,177           | 14.6    | -16            |
| Miscellaneous:                      |                   |         |                   |         |                |
| Scoter-----                         | --                | --      | --                | --      | --             |
| Merganser-----                      | 75,417            | 1.3     | 52,888            | 1.2     | -30            |
| Subtotal-----                       | 75,417            | 1.3     | 52,888            | 1.2     | -18            |
| Total ducks-----                    | 4,422,456         | 78.2    | 3,323,018         | 75.2    | -25            |
| Geese:                              |                   |         |                   |         |                |
| Canada goose-----                   | 164,538           | 2.9     | 163,712           | 4.0     | -1             |
| Snow goose-----                     | 215,186           | 3.8     | 218,688           | 5.0     | +1             |
| White-fronted goose-----            | 14,779            | .3      | 23,747            | .5      | +60            |
| Blue goose-----                     | 61,556            | 1.1     | 421               | Trace   | --             |
| Total geese-----                    | 456,059           | 8.1     | 406,568           | 9.5     | -11            |
| Swan:                               |                   |         |                   |         |                |
| Whistling swan-----                 | 53                | Trace   | 55                | Trace   | --             |
| Trumpeter swan-----                 | 264               | Trace   | 137               | Trace   | -49            |
| Total swan-----                     | 317               |         | 192               |         | -39            |
| Coot-----                           | 782,743           | 13.8    | 642,504           | 14.3    | -18            |
| All species:                        |                   |         |                   |         |                |
| Total identified-----               | 5,661,575         | 100.1   | 4,372,282         | 99.0    | -23            |
| Miscellaneous and unidentified----- | 28,297            | --      | 111,718           |         |                |
| Grand total-----                    | 5,689,872         | --      | 4,484,000         |         | -21            |

<sup>1</sup> Based on comparable coverage in 1961 and observed waterfowl (unadjusted for comparable coverage) in 1962.

TABLE C-6.--Distribution of wintering waterfowl, Central Flyway extended, 1957-62  
[Index numbers]

| Area                        | 1957      | 1958      | 1959      | 1960      | 1961      | 1962 <sup>1</sup> |
|-----------------------------|-----------|-----------|-----------|-----------|-----------|-------------------|
| Montana-----                | 80,087    | 110,461   | 127,791   | 74,331    | 89,009    | 82,385            |
| North Dakota-----           | 7,485     | 34,041    | 2,100     | 31        | 2,127     | 200               |
| South Dakota-----           | 354,898   | 1,361,951 | 605,243   | 93,638    | 353,967   | 156,091           |
| Wyoming-----                | 83,794    | 67,246    | 75,700    | 79,662    | 51,620    | 49,467            |
| Nebraska-----               | 363,248   | 589,858   | 331,855   | 306,412   | 204,039   | 134,262           |
| Colorado-----               | 583,326   | 722,718   | 473,669   | 437,045   | 387,710   | 300,638           |
| Kansas-----                 | 405,132   | 643,340   | 355,447   | 379,557   | 492,326   | 311,686           |
| New Mexico-----             | 145,636   | 103,440   | 143,111   | 82,373    | 93,343    | 148,245           |
| Oklahoma-----               | 62,851    | 124,825   | 193,685   | 114,211   | 106,278   | 151,077           |
| Texas-----                  | 1,633,846 | 3,581,556 | 3,675,032 | 2,384,384 | 2,109,680 | 1,890,952         |
| Mexico:                     |           |           |           |           |           |                   |
| East coast-----             | --        | 1,609,110 | 1,268,048 | 817,896   | 1,344,340 | 979,374           |
| Central-----                | --        | 546,637   | 1,097,771 | 518,181   | 522,803   | 279,623           |
| Central America-----        | --        | --        | --        | 28,470    | --        | --                |
| Northern South America----- | --        | --        | --        | 475,254   | --        | --                |
| Total-----                  | 3,722,303 | 9,495,183 | 8,349,452 | 5,791,445 | 5,757,242 | 4,484,000         |
| Comparable coverage:        |           |           |           |           |           |                   |
| 1956-1957-----              | 3,631,478 | --        | --        | --        | --        | --                |
| 1957-1958-----              | 3,696,773 | 7,057,996 | --        | --        | --        | --                |
| 1958-1959-----              | --        | 9,495,183 | 8,263,472 | --        | --        | --                |
| 1959-1960-----              | --        | --        | 8,334,711 | 5,268,271 | --        | --                |
| 1960-1961-----              | --        | --        | --        | 5,271,839 | 5,689,872 | --                |

<sup>1</sup> Winter survey figures are based upon observed waterfowl and have not been adjusted for comparable coverage.

TABLE C-7.--Trend in waterfowl numbers, Central Flyway extended, winter survey, 1949-62  
[In thousands]

| Year      | Ducks              | Geese | Coot  | Total |
|-----------|--------------------|-------|-------|-------|
| 1949----- | 4,256              | 1,031 | 1,139 | 6,426 |
| 1950----- | 5,542              | 839   | 615   | 6,996 |
| 1951----- | 4,733              | 507   | 375   | 5,615 |
| 1952----- | 6,116              | 409   | 1,017 | 7,542 |
| 1953----- | 5,591              | 512   | 578   | 6,681 |
| 1954----- | 6,441              | 723   | 1,322 | 8,486 |
| 1955----- | 5,746              | 521   | 594   | 6,861 |
| 1956----- | 7,814              | 693   | 1,025 | 9,532 |
| 1957----- | 4,248              | 443   | 1,364 | 5,055 |
| 1958----- | 8,202              | 567   | 812   | 9,581 |
| 1959----- | 7,233              | 425   | 691   | 8,349 |
| 1960----- | 4,240              | 501   | 536   | 5,277 |
| 1961----- | 4,447              | 461   | 788   | 5,696 |
| 1962----- | <sup>2</sup> 3,434 | 407   | 643   | 4,484 |

Note.--Coverage during the period was not comparable and the data were adjusted, using 1959 and 1955 as base years. It was assumed that areas where comparable surveys were conducted provided an accurate measure of the percentage change between 2 consecutive years. On this basis, population estimates were calculated backward and forward from the base years. The 1962 figures are based upon only observed birds and are not adjusted.

<sup>1</sup> No surveys were conducted in Mexico in 1957. The data indicate that it is unlikely that surveys in the United States alone accurately revealed the trend in wintering population for either ducks or coot that year.

<sup>2</sup> Includes 111,718 miscellaneous unidentified birds.

TABLE C-8.--Number of birds, by species, Mississippi Flyway extended, winter survey, 1961 and 1962

| Species                             | 1961 <sup>1</sup>   |         | 1962 <sup>1</sup>   |         | Percent change |
|-------------------------------------|---------------------|---------|---------------------|---------|----------------|
|                                     | Number              | Percent | Number              | Percent |                |
| Ducks:                              |                     |         |                     |         |                |
| Dabblers:                           |                     |         |                     |         |                |
| Pintail-----                        | 543,336             | 5.9     | 577,694             | 7.3     | +6             |
| Mallard-----                        | 3,250,623           | 35.2    | 1,995,376           | 25.2    | -39            |
| American widgeon-----               | 358,788             | 3.9     | 362,834             | 4.6     | +1             |
| Shoveler-----                       | 303,302             | 3.3     | 279,402             | 3.5     | -8             |
| Gadwall-----                        | 453,101             | 4.9     | 407,484             | 5.1     | -11            |
| Blue-winged teal-----               | 284,001             | 3.1     | 300,800             | 3.8     | +5             |
| Green-winged teal-----              | 454,621             | 4.9     | 520,549             | 6.6     | +14            |
| Black duck-----                     | 165,752             | 1.8     | 112,784             | 1.4     | -32            |
| Wood duck-----                      | 95,768              | 1.0     | 24,953              | 0.3     | -74            |
| Subtotal-----                       | 5,909,292           | 64.0    | 4,581,876           | 57.8    | -22            |
| Divers:                             |                     |         |                     |         |                |
| Scaup-----                          | 1,625,578           | 17.5    | 1,766,291           | 22.2    | +8             |
| Canvasback-----                     | 39,682              | .4      | 40,690              | 0.6     | +2             |
| Redhead-----                        | 11,146              | .1      | 10,461              | 0.1     | -7             |
| Ring-necked duck-----               | 77,461              | .8      | 123,665             | 1.6     | +59            |
| Goldeneye-----                      | 48,420              | .5      | 27,818              | 0.3     | -43            |
| Bufflehead-----                     | 2,326               | Trace   | 3,562               | Trace   | +53            |
| Ruddy duck-----                     | 21,134              | .2      | 25,691              | 0.3     | +21            |
| Subtotal-----                       | 1,825,747           | 19.5    | 1,998,178           | 25.1    | +9             |
| Miscellaneous:                      |                     |         |                     |         |                |
| Scoter and eider-----               | 8                   | Trace   | 268                 | Trace   | --             |
| Oldsquaw-----                       | 16,208              | .2      | 2,462               | Trace   | -85            |
| Merganser-----                      | 63,306              | .7      | 56,998              | 0.7     | -10            |
| Subtotal-----                       | 79,522              | .9      | 59,728              | 0.7     | -25            |
| Total ducks-----                    | 7,814,561           | 84.4    | 6,639,782           | 83.6    | -15            |
| Geese:                              |                     |         |                     |         |                |
| Canada goose-----                   | 348,893             | 3.8     | 339,507             | 4.3     | -3             |
| Snow goose-----                     | 58,655              | .6      | 45,152              | 0.6     | -24            |
| White-fronted goose-----            | 24,500              | .3      | 20,010              | 0.2     | -19            |
| Blue goose-----                     | 470,144             | 5.1     | 323,844             | 4.1     | -32            |
| Total geese-----                    | 902,192             | 9.8     | 728,513             | 9.2     | -19            |
| Whistling swan-----                 | <sup>1</sup> 151    | Trace   | 181                 | Trace   | +19            |
| Coot-----                           | 524,861             | 5.7     | 569,190             | 7.2     | +8             |
| All species:                        |                     |         |                     |         |                |
| Total identified-----               | 9,241,765           | 99.9    | 7,937,666           | 100.0   | -14            |
| Miscellaneous and unidentified----- | <sup>2</sup> 32,730 | --      | <sup>3</sup> 37,549 |         |                |
| Grand total-----                    | 9,274,495           | --      | 7,975,215           |         | -14            |

<sup>1</sup> Based on comparable coverage in 1961 and on observed waterfowl only in 1962.<sup>2</sup> Includes 17,200 mottled ducks, in addition to unidentified species.<sup>3</sup> Includes (28,100) mottled ducks and (157) mute swan.

TABLE C-9.--Distribution of wintering waterfowl, Mississippi Flyway extended, 1957-62  
[Index numbers]

| Area                 | 1957             | 1958             | 1959             | 1960             | 1961             | 1962 <sup>1</sup> |
|----------------------|------------------|------------------|------------------|------------------|------------------|-------------------|
| Ontario-----         | 91,066           | 62,998           | 63,501           | 70,742           | 55,754           | 27,936            |
| Minnesota-----       | 33,754           | 21,322           | 13,302           | 8,418            | 14,577           | 8,612             |
| Wisconsin-----       | 40,541           | 38,349           | 37,101           | 55,722           | 81,201           | 38,447            |
| Michigan-----        | 139,964          | 106,248          | 142,209          | 53,058           | 50,635           | 21,252            |
| Iowa-----            | 110,183          | 162,258          | 121,473          | 47,659           | 378,755          | 9,976             |
| Missouri-----        | 405,082          | 370,729          | 357,760          | 250,769          | 293,211          | 287,804           |
| Illinois-----        | 2,117,470        | 604,561          | 728,071          | 663,071          | 549,605          | 264,899           |
| Indiana-----         | 518,160          | 732,720          | 485,136          | 355,210          | 274,093          | 24,966            |
| Ohio-----            | 170,476          | 50,841           | 56,119           | 77,775           | 149,322          | 51,123            |
| Kentucky-----        | 197,306          | 241,003          | 245,100          | 95,500           | 67,200           | 130,200           |
| Arkansas-----        | 1,231,800        | 1,674,022        | 1,443,900        | 1,336,533        | 1,282,800        | 945,500           |
| Tennessee-----       | 484,439          | 664,157          | 585,800          | 310,203          | 360,100          | 212,500           |
| Louisiana-----       | 2,620,500        | 2,823,395        | 3,372,000        | 4,243,000        | 5,462,000        | 5,514,900         |
| Mississippi-----     | 195,325          | 161,392          | 118,600          | 139,304          | 125,700          | 227,900           |
| Alabama-----         | 145,138          | 91,589           | 118,800          | 118,286          | 183,000          | 209,200           |
| <b>Total-----</b>    | <b>8,501,204</b> | <b>7,805,584</b> | <b>7,888,872</b> | <b>7,925,250</b> | <b>9,327,953</b> | <b>7,975,215</b>  |
| Comparable coverage: |                  |                  |                  |                  |                  |                   |
| 1956-1957-----       | 8,496,704        | --               | --               | --               | --               | --                |
| 1957-1958-----       | 8,499,859        | 7,720,732        | --               | --               | --               | --                |
| 1958-1959-----       | --               | 7,805,584        | 7,883,372        | --               | --               | --                |
| 1959-1960-----       | --               | --               | 7,886,407        | 7,882,450        | --               | --                |
| 1960-1961-----       | --               | --               | --               | 7,925,227        | 9,274,495        | --                |

<sup>1</sup> Winter survey figures 1962 are based upon observed water fowl and have not been adjusted for comparable coverage.

TABLE C-10.--Trend in waterfowl numbers, Mississippi Flyway extended, winter survey, 1949-62

[In thousands]

| Year      | Ducks              | Geese | Coot | Total |
|-----------|--------------------|-------|------|-------|
| 1949----- | 4,164              | 680   | 265  | 5,109 |
| 1950----- | 2,842              | 601   | 211  | 3,654 |
| 1951----- | 5,640              | 625   | 251  | 6,516 |
| 1952----- | 3,961              | 559   | 404  | 4,924 |
| 1953----- | 5,240              | 664   | 100  | 6,004 |
| 1954----- | 5,403              | 783   | 123  | 6,309 |
| 1955----- | 5,344              | 680   | 132  | 6,156 |
| 1956----- | 7,460              | 768   | 137  | 8,365 |
| 1957----- | 7,716              | 737   | 187  | 8,640 |
| 1958----- | 6,759              | 750   | 295  | 7,804 |
| 1959----- | 6,890              | 711   | 288  | 7,889 |
| 1960----- | 6,684              | 767   | 434  | 7,885 |
| 1961----- | 7,802              | 902   | 524  | 9,228 |
| 1962----- | <sup>1</sup> 6,677 | 729   | 569  | 7,975 |

Note.--Coverage during the period was not comparable and the data were adjusted, using 1959 and 1955 as base years. It was assumed that areas where comparable surveys were conducted provided an accurate measure of the percentage change between 2 consecutive years. On this basis, population estimates were calculated backward and forward from the base years. The 1962 figures are based upon only observed birds and are not adjusted.

<sup>1</sup> Includes 37,549 miscellaneous and unidentified birds.

TABLE C-11.--Number of birds, by species, Atlantic Flyway extended, winter survey, 1961 and 1962

| Species                             | 1961      |         | 1962      |         | Percent change |
|-------------------------------------|-----------|---------|-----------|---------|----------------|
|                                     | Number    | Percent | Number    | Percent |                |
| Ducks:                              |           |         |           |         |                |
| Dabblers:                           |           |         |           |         |                |
| Pintail-----                        | 215,339   | 5.7     | 176,504   | 5.4     | -19            |
| Mallard-----                        | 223,524   | 5.9     | 148,805   | 5.0     | -34            |
| American widgeon-----               | 103,470   | 2.7     | 114,200   | 3.5     | +10            |
| Shoveler-----                       | 22,700    | .6      | 13,400    | 0.4     | -41            |
| Gadwall-----                        | 38,856    | 1.0     | 40,000    | 1.2     | +2             |
| Blue-winged teal-----               | 35,000    | .9      | 27,800    | 0.8     | -21            |
| Green-winged teal-----              | 89,633    | 2.4     | 73,113    | 2.2     | -19            |
| Mottled duck-----                   | 1,800     | Trace   | 3,400     | 0.1     | +88            |
| Black duck-----                     | 331,690   | 8.8     | 344,879   | 11.0    | +3             |
| Wood duck-----                      | 11,927    | .3      | 13,000    | 0.4     | +8             |
| Subtotal-----                       | 1,073,939 | 28.3    | 955,101   | 30.0    | -17            |
| Divers:                             |           |         |           |         |                |
| Scaup-----                          | 700,176   | 18.6    | 707,874   | 22.0    | +1             |
| Canvasback-----                     | 157,806   | 4.2     | 137,600   | 4.2     | -13            |
| Redhead-----                        | 89,205    | 2.4     | 98,100    | 3.0     | +9             |
| Ring-necked duck-----               | 97,028    | 2.6     | 78,600    | 2.4     | -19            |
| Goldeneye-----                      | 90,065    | 2.4     | 79,350    | 2.4     | -12            |
| Bufflehead-----                     | 57,069    | 1.5     | 30,159    | 1.0     | -48            |
| Ruddy duck-----                     | 55,796    | 1.5     | 85,900    | 3.0     | +53            |
| Subtotal-----                       | 1,247,145 | 33.2    | 1,217,583 | 38.0    | -2             |
| Miscellaneous:                      |           |         |           |         |                |
| Scoter and eider-----               | 64,282    | 1.7     | 82,058    | 2.5     | +27            |
| Oldsquaw-----                       | 25,533    | .7      | 6,807     | 0.2     | -74            |
| Merganser-----                      | 93,964    | 2.5     | 78,958    | 2.4     | -16            |
| Subtotal-----                       | 183,779   | 4.9     | 167,823   | 5.1     | -9             |
| Total ducks-----                    | 2,504,863 | 66.4    | 2,340,518 | 73.1    | -7             |
| Geese:                              |           |         |           |         |                |
| Canada goose-----                   | 544,379   | 14.4    | 418,895   | 13.0    | -24            |
| Snow goose-----                     | 67,110    | 1.8     | 49,700    | 1.5     | -26            |
| Blue goose-----                     | 804       | Trace   | 400       | Trace   | -51            |
| Total geese-----                    | 612,293   | 16.2    | 468,995   | 14.5    | -23            |
| American brant-----                 | 265,613   | 7.0     | 124,600   | 4.0     | -54            |
| Whistling swan-----                 | 62,538    | 1.7     | 39,400    | 1.2     | -37            |
| Coot-----                           | 325,005   | 8.7     | 230,300   | 7.2     | -30            |
| All species:                        |           |         |           |         |                |
| Total identified-----               | 3,770,312 | 100.0   | 3,203,802 | 100.0   |                |
| Miscellaneous and unidentified----- | 35,942    | --      | 43,880    |         |                |
| Grand total-----                    | 3,806,254 | --      | 3,247,682 |         | -15            |

TABLE C-12.--Distribution of wintering waterfowl, Atlantic Flyway extended 1957-62  
[Index numbers]

| Area                        | 1957      | 1958      | 1959      | 1960      | 1961      | 1962 <sup>2</sup> |
|-----------------------------|-----------|-----------|-----------|-----------|-----------|-------------------|
| Newfoundland-----           | 22,539    | 8,706     | 8,466     | 7,091     | 13,797    | 16,855            |
| Quebec-----                 | 1,725     | 2,821     | 952       | 819       | 2,018     | 436               |
| Maritime Provinces-----     | 27,134    | 22,580    | 33,288    | 33,773    | 21,350    | 16,191            |
| Maine-----                  | 31,711    | 17,575    | 39,909    | 47,971    | 40,362    | 50,200            |
| New Hampshire-----          | 2,765     | 3,952     | 1,178     | 3,014     | 3,385     | 6,700             |
| Massachusetts-----          | 86,132    | 91,168    | 63,844    | 100,600   | 83,209    | 119,300           |
| Connecticut-----            | 32,746    | 60,803    | 46,816    | 58,805    | 54,294    | 54,200            |
| Rhode Island-----           | 28,273    | 39,842    | 27,933    | 34,594    | 22,718    | 24,000            |
| New York <sup>1</sup> ----- | 216,041   | 298,002   | 208,895   | 268,026   | 264,859   | 299,900           |
| New Jersey-----             | 404,001   | 333,901   | 313,414   | 389,680   | 345,556   | 247,900           |
| Pennsylvania-----           | 26,271    | 20,470    | 19,990    | 33,719    | 18,682    | 22,200            |
| Delaware-----               | 34,048    | 26,330    | 33,102    | 71,875    | 101,592   | 97,800            |
| Maryland-----               | 803,500   | 434,453   | 329,600   | 476,900   | 637,200   | 526,000           |
| Virginia-----               | 172,300   | 90,393    | 103,300   | 162,202   | 202,900   | 162,600           |
| West Virginia-----          | 7,210     | 6,015     | 11,834    | 1,857     | 2,532     | 2,900             |
| North Carolina-----         | 315,200   | 472,330   | 334,600   | 416,100   | 548,000   | 360,500           |
| South Carolina-----         | 483,100   | 394,030   | 702,100   | 678,765   | 578,600   | 474,100           |
| Georgia-----                | 20,500    | 37,200    | 81,700    | 47,152    | 86,900    | 47,500            |
| Florida-----                | 1,166,800 | 872,517   | 775,900   | 552,040   | 782,200   | 718,400           |
| West Indies-----            | --        | --        | 36,560    | --        | --        | --                |
| Total-----                  | 3,881,996 | 3,233,088 | 3,173,381 | 3,384,983 | 3,810,154 | 3,247,682         |
| Comparable coverage:        |           |           |           |           |           |                   |
| 1956-1957-----              | 3,877,962 | --        | --        | --        | --        | --                |
| 1957-1958-----              | 3,881,928 | 3,232,138 | --        | --        | --        | --                |
| 1958-1959-----              | --        | 3,233,088 | 3,232,138 | --        | --        | --                |
| 1959-1960-----              | --        | --        | 3,133,558 | 3,367,948 | --        | --                |
| 1960-1961-----              | --        | --        | --        | 3,380,148 | 3,806,254 | --                |

<sup>1</sup> Vermont included with New York.

<sup>2</sup> Winter survey figures are based upon observed waterfowl and have not been adjusted for comparable coverage.

TABLE C-13.--Trend in waterfowl numbers, Atlantic Flyway extended, winter survey, 1949-62

[In thousands]

| Year      | Ducks | Geese | Brant | Swan | Coot  | Total |
|-----------|-------|-------|-------|------|-------|-------|
| 1949----- | 2,685 | 365   | 75    | 42   | 863   | 4,030 |
| 1950----- | 2,757 | 349   | 77    | 31   | 661   | 3,875 |
| 1951----- | 3,314 | 334   | 114   | 34   | 560   | 4,356 |
| 1952----- | 3,904 | 344   | 104   | 36   | 540   | 4,928 |
| 1953----- | 4,670 | 552   | 155   | 56   | 1,403 | 6,836 |
| 1954----- | 3,879 | 396   | 245   | 53   | 352   | 4,925 |
| 1955----- | 4,344 | 567   | 184   | 90   | 616   | 5,801 |
| 1956----- | 3,892 | 549   | 164   | 39   | 852   | 5,496 |
| 1957----- | 2,862 | 403   | 162   | 40   | 649   | 4,116 |
| 1958----- | 2,271 | 366   | 211   | 28   | 394   | 3,270 |
| 1959----- | 2,278 | 339   | 217   | 28   | 311   | 3,173 |
| 1960----- | 2,365 | 449   | 238   | 41   | 315   | 3,408 |
| 1961----- | 2,566 | 613   | 265   | 61   | 331   | 3,836 |
| 1962----- | 2,384 | 469   | 125   | 39   | 230   | 3,247 |

Note.--Coverage during the period was not comparable and the data were adjusted, using 1959 and 1955 as base years. It was assumed that areas where comparable surveys were conducted provided an accurate measure of the percentage change between 2 consecutive years. On this basis, population estimates were calculated backward and forward from the base years. The 1962 figures are based upon only observed birds and are not adjusted.

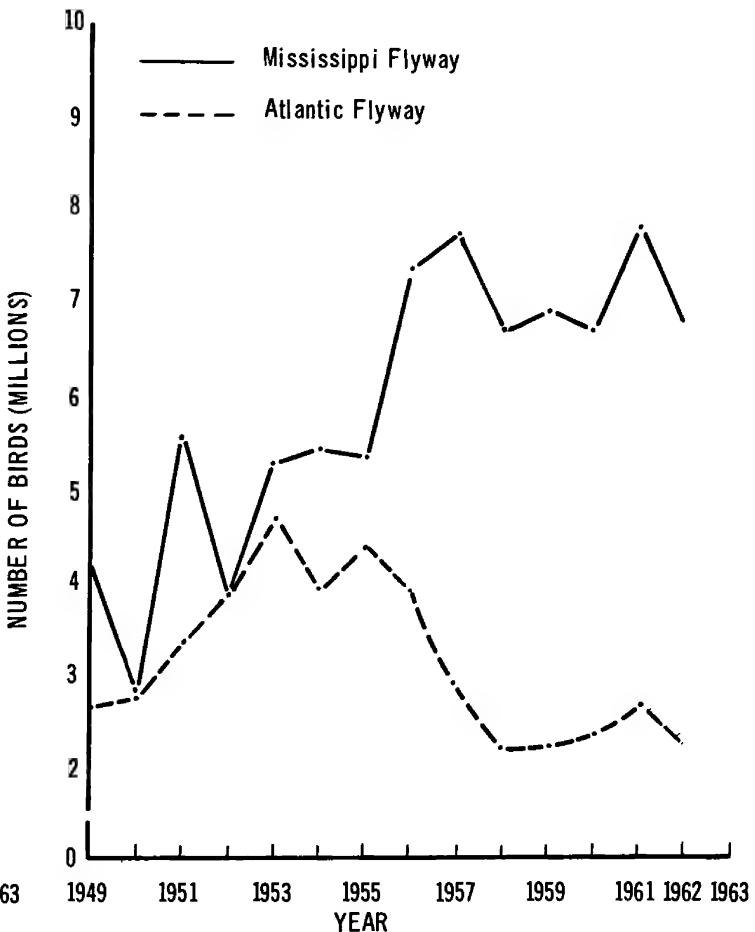
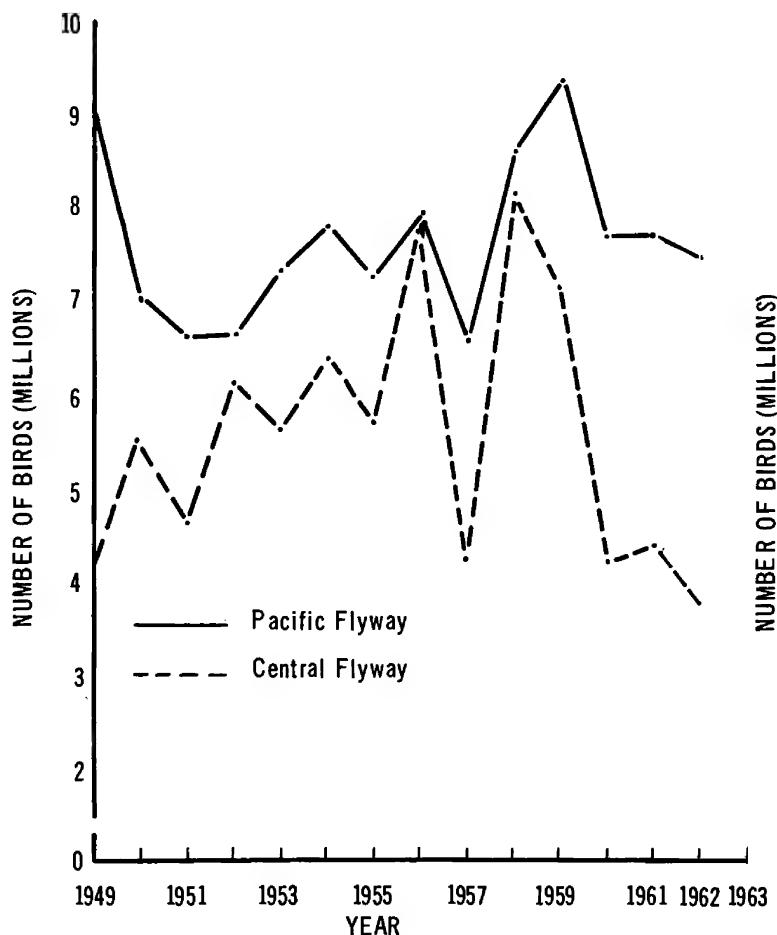


FIGURE C-1.--Trends in numbers of wintering ducks, by Flyways, 1949-62

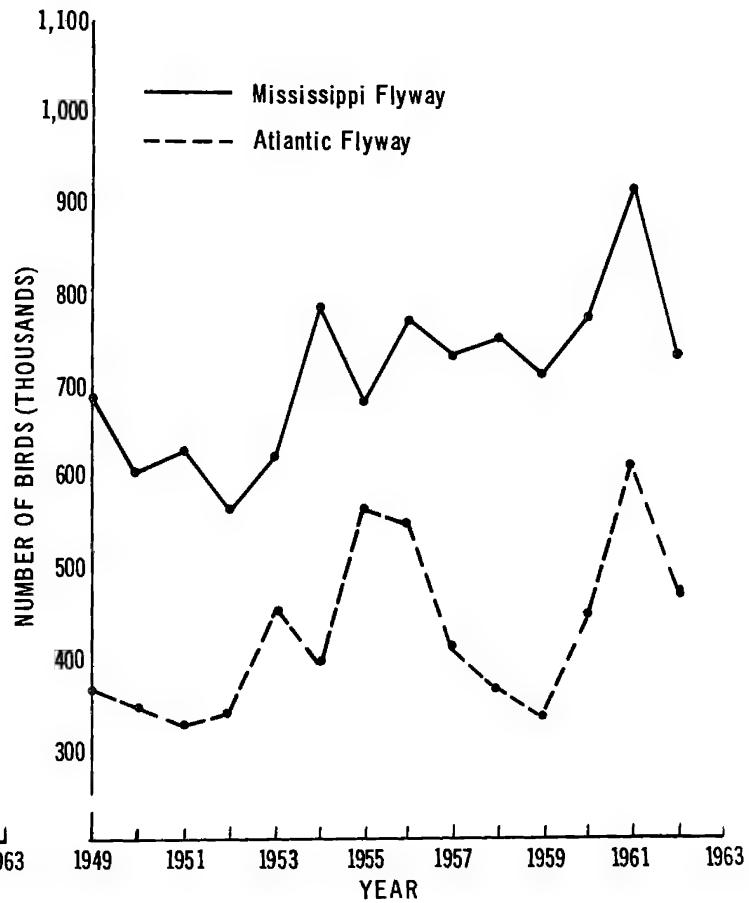
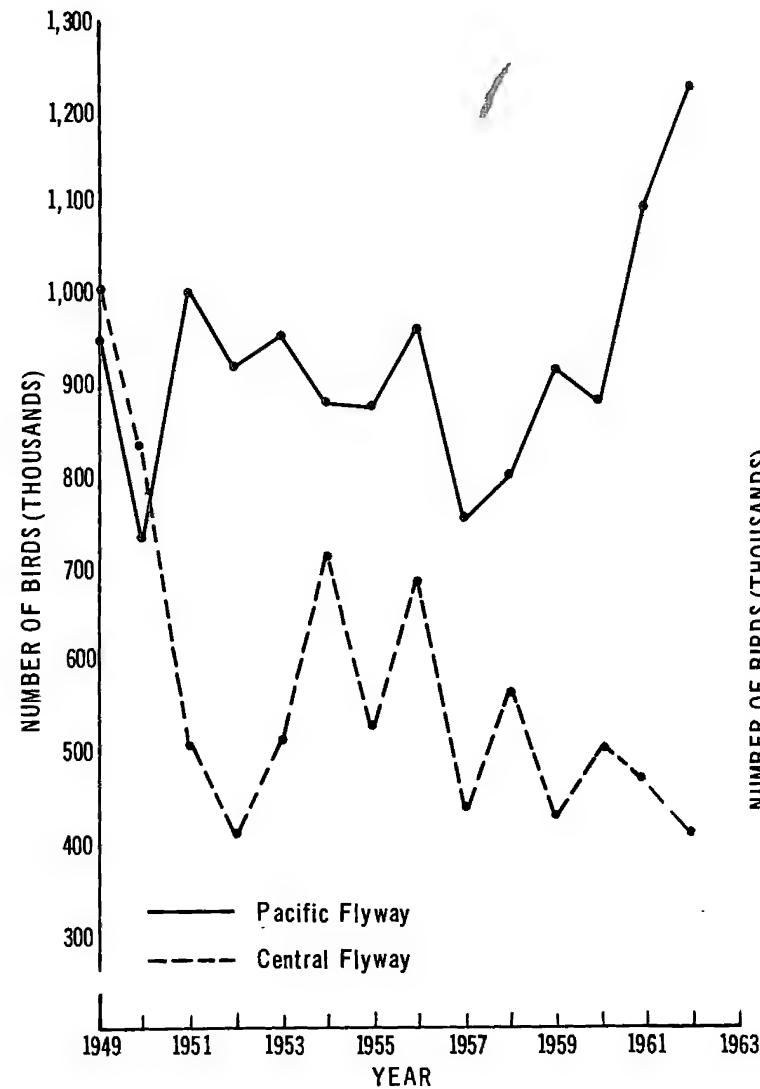


FIGURE C-2.--Trend in numbers of wintering geese, by Flyways, 1949-62.

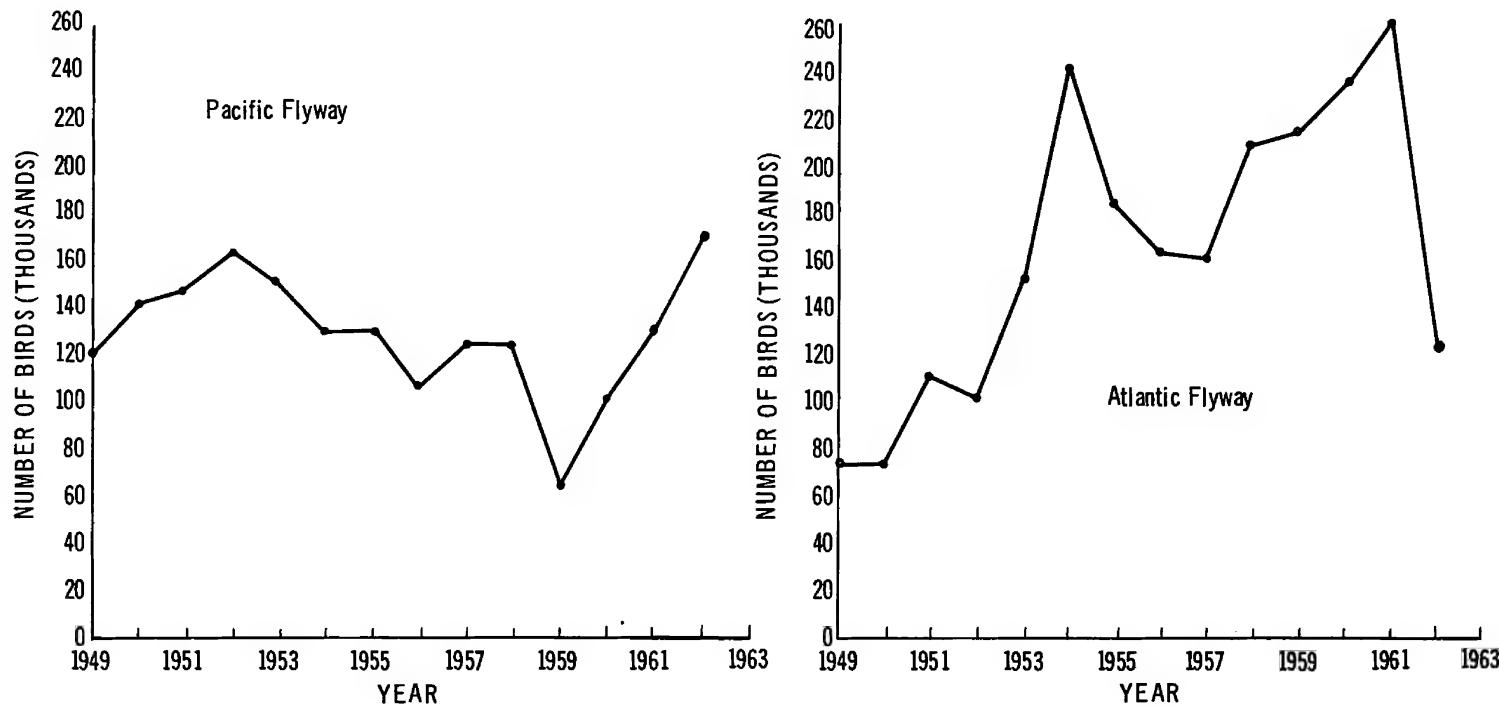


FIGURE C-3.--Trend in numbers of wintering brant, by Flyways, 1949-62.

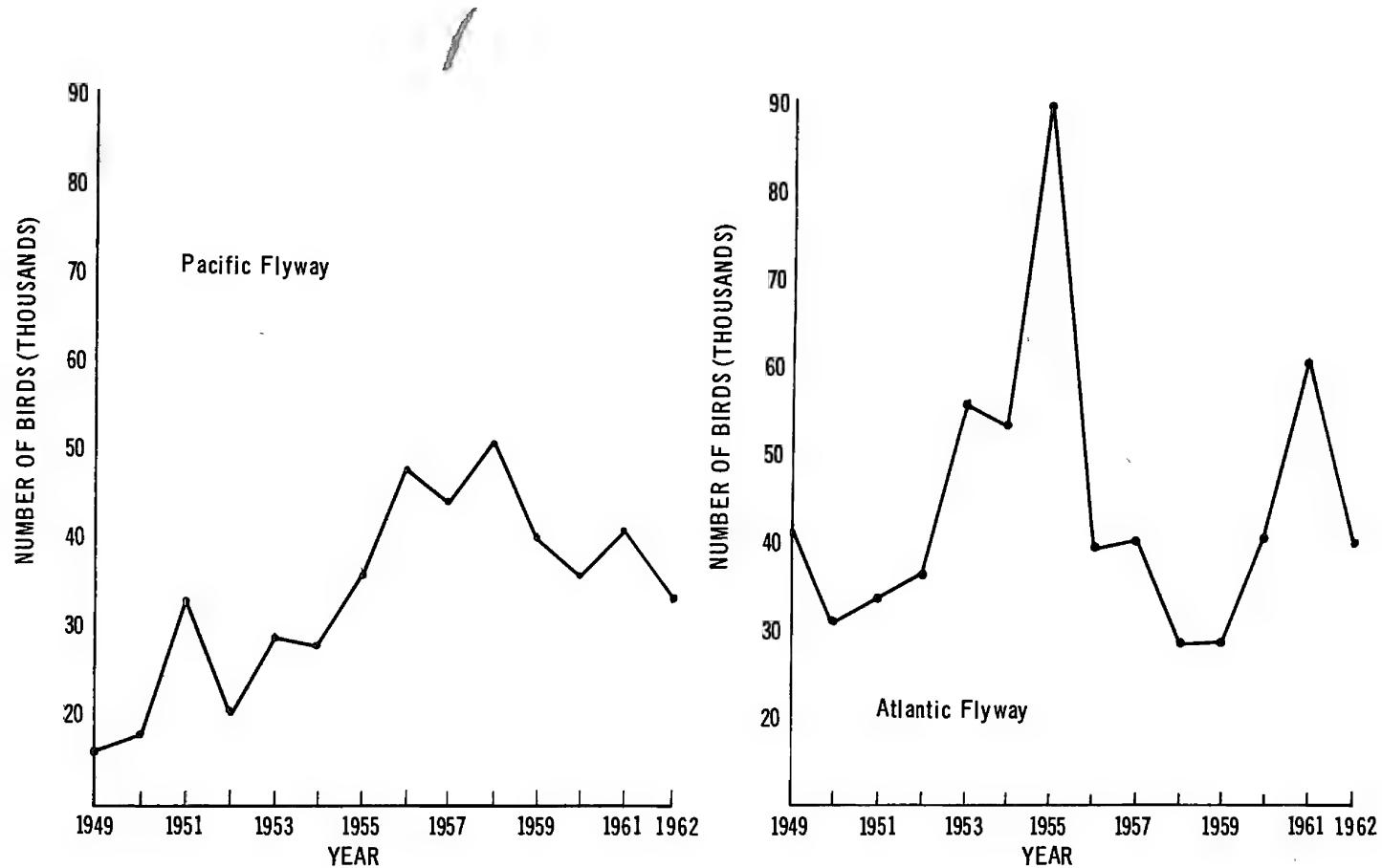


FIGURE C-4.--Trend in numbers of wintering swan, by Flyways, 1949-62.

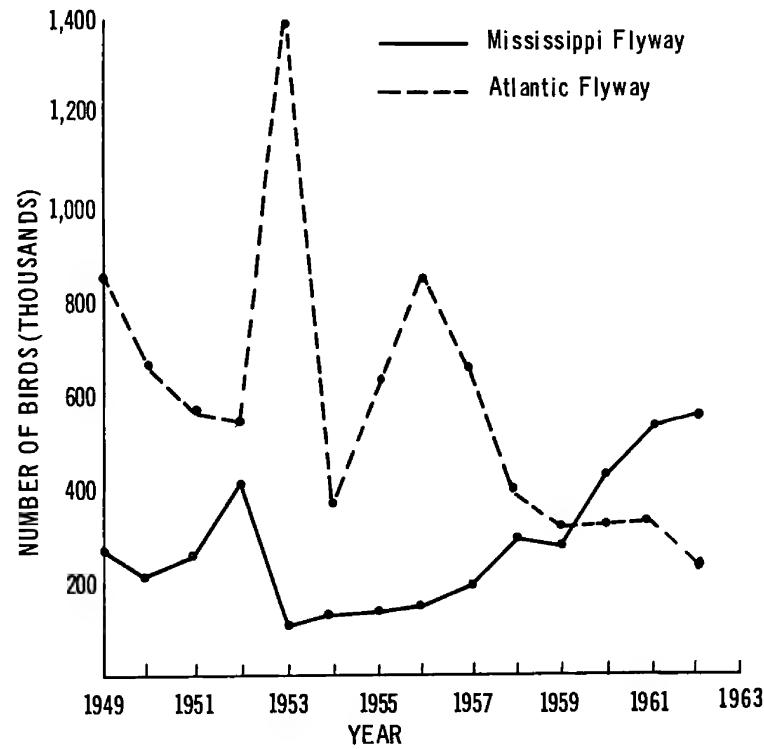
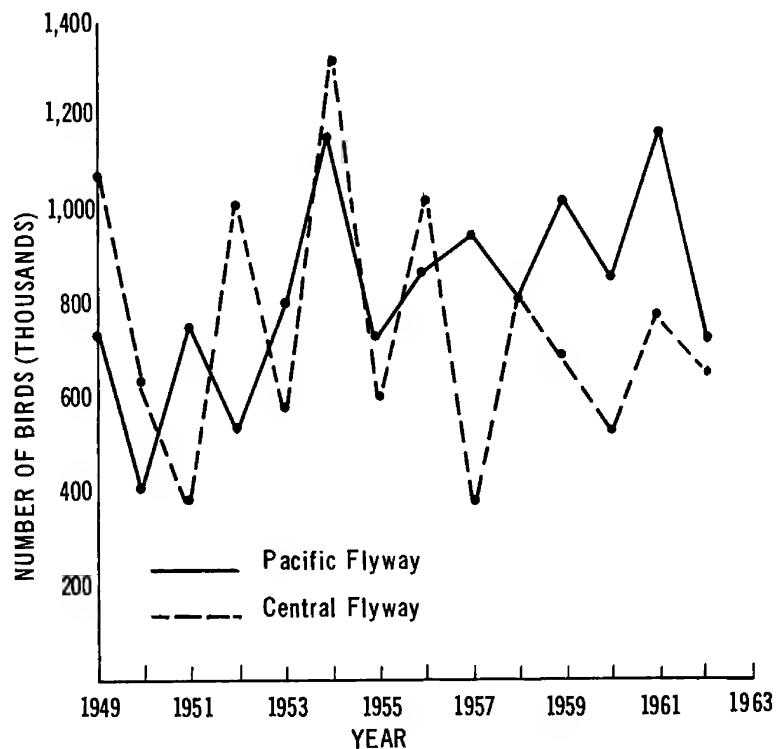


FIGURE C-5.--Trend in numbers of wintering coots, by Flyways, 1949-62.

## D. WATER AREA SURVEY TABLES

TABLE D-1.--Estimated number of water areas, southern Alberta, 1952-62  
[Index numbers, in thousands]

| Year                        | Stratum |     |     | Total |
|-----------------------------|---------|-----|-----|-------|
|                             | A       | B   | C   |       |
| May:                        |         |     |     |       |
| 1952-----                   | 402     | 566 | 135 | 1,103 |
| 1953-----                   | 369     | 539 | 144 | 1,052 |
| 1954-----                   | 434     | 607 | 122 | 1,163 |
| 1955-----                   | 405     | 656 | 191 | 1,252 |
| 1956-----                   | 353     | 598 | 116 | 1,067 |
| 1957-----                   | 187     | 442 | 82  | 706   |
| 1958-----                   | 255     | 431 | 120 | 806   |
| 1959-----                   | 131     | 253 | 120 | 504   |
| 1960-----                   | 257     | 550 | 193 | 1,000 |
| 1961-----                   | 191     | 432 | 69  | 692   |
| 1962-----                   | 118     | 345 | 60  | 523   |
| Average, 1952-61-----       | 276     | 493 | 123 | 523   |
| Percent change, 1962 from-- |         |     |     |       |
| Average-----                | -57     | -30 | -52 | -43   |
| 1961-----                   | -38     | -20 | -13 | -24   |
| July:                       |         |     |     |       |
| 1952-----                   | 308     | 396 | 114 | 818   |
| 1953-----                   | 408     | 363 | 150 | 921   |
| 1954-----                   | 241     | 400 | 65  | 706   |
| 1955-----                   | 218     | 339 | 66  | 623   |
| 1956-----                   | 185     | 420 | 64  | 669   |
| 1957-----                   | 120     | 288 | 42  | 450   |
| 1958-----                   | 136     | 282 | 53  | 471   |
| 1959-----                   | 93      | 140 | 74  | 307   |
| 1960-----                   | 84      | 263 | 57  | 403   |
| 1961-----                   | 51      | 153 | 35  | 239   |
| 1962-----                   | 65      | 257 | 48  | 360   |
| Average, 1952-61-----       | 174     | 300 | 70  | 542   |
| Percent change, 1962 from-- |         |     |     |       |
| Average-----                | -63     | -14 | -32 | -34   |
| 1961-----                   | +28     | +68 | +36 | +51   |

TABLE D-2.--Number of water areas, by years, southern Saskatchewan, 1952-62  
[Index numbers, in thousands]

| Year      | May   | July  | Year      | May   | July |
|-----------|-------|-------|-----------|-------|------|
| 1952----- | 2,306 | 855   | 1958----- | 1,663 | 765  |
| 1953----- | 3,727 | 2,551 | 1959----- | 783   | 428  |
| 1954----- | 4,264 | 3,037 | 1960----- | 2,098 | 916  |
| 1955----- | 4,033 | 3,794 | 1961----- | 589   | 193  |
| 1956----- | 2,489 | 1,753 | 1962----- | 1,124 | 278  |
| 1957----- | 1,445 | 1,254 |           |       |      |

TABLE D-3.--Number of water areas per square mile, Montana, 1959-62

|                                  | Sheridan<br>County | Hi-Line |         | Great Falls-<br>Piedmont | Total |
|----------------------------------|--------------------|---------|---------|--------------------------|-------|
|                                  |                    | Eastern | Central |                          |       |
| <b>Reservoirs:</b>               |                    |         |         |                          |       |
| 1959-----                        | 0.43               | 0.64    | 1.10    | 1.22                     | 0.95  |
| 1960-----                        | .35                | .51     | .91     | 1.79                     | 1.00  |
| 1961-----                        | .27                | .55     | 1.09    | .83                      | .81   |
| 1962-----                        | .24                | .59     | 1.09    | 1.11                     | 3.03  |
| <b>Potholes:</b>                 |                    |         |         |                          |       |
| 1959-----                        | 2.64               | .34     | 2.21    | 1.44                     | 1.45  |
| 1960-----                        | 9.09               | 1.10    | 3.19    | 1.14                     | 2.32  |
| 1961-----                        | 4.40               | .43     | .22     | .52                      | .60   |
| 1962-----                        | 3.04               | .63     | 1.64    | .30                      | 5.61  |
| <b>Other water areas:</b>        |                    |         |         |                          |       |
| 1959-----                        | .43                | .88     | .73     | 1.04                     | .84   |
| 1960-----                        | .59                | 1.18    | .84     | 1.05                     | .99   |
| 1961-----                        | .40                | .98     | .51     | .96                      | .77   |
| 1962-----                        | .53                | 1.08    | 1.09    | .59                      | 3.29  |
| <b>Total:</b>                    |                    |         |         |                          |       |
| 1959-----                        | 3.50               | 1.86    | 4.04    | 3.69                     | 3.25  |
| 1960-----                        | 10.03              | 2.79    | 4.94    | 3.98                     | 4.30  |
| 1961-----                        | 5.07               | 1.96    | 1.83    | 2.31                     | 2.18  |
| 1962-----                        | 3.81               | 2.30    | 3.82    | 1.79                     | 2.93  |
| Percent change, 1962 from 1961-- | -25                | +17     | +1.09   | -23                      | +34   |

TABLE D-4.--Number of water areas, by stratum, North Dakota, South Dakota, and western Minnesota, 1958-62  
[Index numbers, in thousands]

|                                   | Stratum |         |      | Total |
|-----------------------------------|---------|---------|------|-------|
|                                   | East    | Central | West |       |
| <b>May:</b>                       |         |         |      |       |
| 1958-----                         | 406     | 320     | 119  | 845   |
| 1959-----                         | 162     | 109     | 69   | 340   |
| 1960-----                         | 223     | 397     | 75   | 695   |
| 1961-----                         | 151     | 105     | 51   | 307   |
| 1962-----                         | 313     | 348     | 111  | 772   |
| Percent change, 1962 from 1961--- | +107    | +230    | +119 | +151  |
| <b>July:</b>                      |         |         |      |       |
| 1958-----                         | 470     | 293     | 254  | 1,017 |
| 1959-----                         | 213     | 110     | 73   | 396   |
| 1960-----                         | 309     | 311     | 116  | 736   |
| 1961-----                         | 166     | 108     | 77   | 351   |
| 1962-----                         | 281     | 231     | 116  | 628   |
| Percent change, 1962 from 1961--- | --      | --      | --   | --    |

NOTE:--Due to a change in recording water areas in 1962, 1962 July pond index is not comparable to previous counts.

TABLE D-5.--Water indexes, North Dakota,  
May 1948-62

| Year                           | Index number |
|--------------------------------|--------------|
| Average, 1948-62-----          | 361,733      |
| 1961-----                      | 168,300      |
| 1962-----                      | 336,406      |
| Percent change, 1962<br>from-- |              |
| Average-----                   | -7           |
| 1961-----                      | +100         |

TABLE D-6.--Number of water areas, South Dakota, 1950-62

[Index numbers]

|                             | Index   | Number per square mile |
|-----------------------------|---------|------------------------|
| <b>May:</b>                 |         |                        |
| 1962:                       |         |                        |
| Stratum 1-----              | 127,945 | 5.96                   |
| Stratum 2-----              | 155,826 | 6.09                   |
| Stratum 3-----              | 71,745  | 2.70                   |
| Total-----                  | 355,516 | 4.83                   |
| 1961-----                   | 127,900 | 1.74                   |
| Average, 1950-61-----       | 307,200 | 4.20                   |
| Percent change, 1962 from-- |         |                        |
| 1961-----                   | +178    | --                     |
| Average-----                | +16     | --                     |
| <b>July:</b>                |         |                        |
| 1962:                       |         |                        |
| Stratum 1-----              | 237,100 | 11.04                  |
| Stratum 2-----              | 245,300 | 9.59                   |
| Stratum 3-----              | 135,300 | 5.09                   |
| Total-----                  | 617,700 | 8.38                   |
| 1961-----                   | 168,300 | 2.29                   |
| Average, 1953-61-----       | 222,500 | 3.02                   |
| Percent change, 1962 from-- |         |                        |
| 1961-----                   | +266    | --                     |
| Average-----                | +177    | --                     |

TABLE D-7.--Number of water areas, by stratum, southern Manitoba, May and July, 1951-62

[Index numbers, in thousands]

| Year                        | Stratum A | Stratum B | Total |
|-----------------------------|-----------|-----------|-------|
| <b>May:</b>                 |           |           |       |
| 1951-----                   | 240       | 186       | 426   |
| 1952-----                   | 174       | 155       | 329   |
| 1953-----                   | 187       | 312       | 499   |
| 1954-----                   | 258       | 1,075     | 1,333 |
| 1955-----                   | 315       | 428       | 743   |
| 1956-----                   | 391       | 615       | 1,006 |
| 1957-----                   | 262       | 404       | 666   |
| 1958-----                   | 352       | 264       | 616   |
| 1959-----                   | 160       | 482       | 642   |
| 1960-----                   | 324       | 295       | 619   |
| 1961-----                   | 158       | 263       | 421   |
| 1962-----                   | 135       | 295       | 430   |
| Average, 1951-61-----       | 256       | 407       | 664   |
| Percent change, 1962 from-- |           |           |       |
| 1961-----                   | -14       | +12       | +2    |
| Average-----                | -47       | -27       | -35   |
| <b>July:</b>                |           |           |       |
| 1954-----                   | 472       | 384       | 856   |
| 1955-----                   | 339       | 271       | 610   |
| 1956-----                   | 426       | 412       | 838   |
| 1957-----                   | 242       | 260       | 502   |
| 1958-----                   | 163       | 341       | 504   |
| 1959-----                   | 96        | 324       | 420   |
| 1960-----                   | 164       | 212       | 376   |
| 1961-----                   | 41        | 88        | 129   |
| 1962-----                   | 97        | 135       | 232   |
| Average, 1954-61-----       | 242       | 286       | 529   |
| Percent change, 1962 from-- |           |           |       |
| 1961-----                   | +136      | +53       | +80   |
| Average-----                | -60       | -53       | -56   |

## E. BREEDING POPULATION SURVEY TABLES

TABLE E-1.--Statistical summary: Alaska waterfowl breeding population survey, 1961 and 1962

|                          | Stratum |         |         |         | Total     |
|--------------------------|---------|---------|---------|---------|-----------|
|                          | II      | III     | IV      | V       |           |
| Area (sq. mi.)-----      | 15,150  | 42,350  | 17,000  | 1,950   | 76,450    |
| Sample (sq. mi.):        |         |         |         |         |           |
| 1961-----                | 104     | 368     | 184     | 52      | 708       |
| 1962-----                | 152     | 332     | 184     | 72      | 740       |
| Population index:        |         |         |         |         |           |
| Ducks per square mile:   |         |         |         |         |           |
| 1961-----                | 11.3    | 19.4    | 37.9    | 63.4    | 23.1      |
| 1962-----                | 12.7    | 18.9    | 30.0    | 63.6    | 21.3      |
| Total ducks:             |         |         |         |         |           |
| 1961-----                | 171,500 | 823,000 | 644,900 | 123,600 | 1,763,060 |
| 1962-----                | 192,000 | 802,500 | 509,900 | 124,100 | 1,628,500 |
| Game ducks: <sup>1</sup> |         |         |         |         |           |
| 1961-----                | 144,890 | 572,550 | 495,280 | 122,500 | 1,335,220 |
| 1962-----                | 177,200 | 619,600 | 406,900 | 119,630 | 1,322,430 |

<sup>1</sup> Excluding scoter, eider, and oldsquaw.

TABLE E-2.--Whistling swan and little brown crane breeding population indexes, Alaska, 1957-62

|                             | 1957   | 1958   | 1959   | 1960   | 1961   | 1962   |
|-----------------------------|--------|--------|--------|--------|--------|--------|
| Area sampled (sq. mi.)----- | 612    | 640    | 644    | 604    | 648    | 492    |
| Whistling swan:             |        |        |        |        |        |        |
| Number counted-----         | 859    | 600    | 546    | 710    | 759    | 470    |
| Birds per square mile-----  | 1,403  | 0.938  | 0.848  | 1.175  | 1.171  | 0.955  |
| Population index-----       | 95,330 | 63,735 | 58,640 | 79,310 | 79,040 | 55,965 |
| Little brown crane:         |        |        |        |        |        |        |
| Number counted-----         | 254    | 235    | 268    | 209    | 285    | 216    |
| Birds per square mile-----  | 0.415  | 0.367  | 0.416  | 0.264  | 0.441  | 0.439  |
| Population index-----       | 31,725 | 24,935 | 31,800 | 20,185 | 30,495 | 25,725 |

TABLE E-3.--Waterfowl breeding population indexes, by species and stratum, Alaska, 1961 and 1962

| Species                | Stratum II |         | Stratum III |         | Stratum IV |         |
|------------------------|------------|---------|-------------|---------|------------|---------|
|                        | 1961       | 1962    | 1961        | 1962    | 1961       | 1962    |
| Dabblers:              |            |         |             |         |            |         |
| Pintail-----           | 38,250     | 95,000  | 219,900     | 221,500 | 153,500    | 135,700 |
| Mallard-----           | 13,750     | 16,500  | 39,600      | 20,100  | 34,180     | 10,700  |
| American widgeon-----  | 1,890      | 5,500   | 13,200      | 14,500  | 22,550     | 17,400  |
| Shoveler-----          | 2,920      | 1,500   | 4,150       | 800     | 6,450      | 3,500   |
| Green-winged teal----- | --         | 750     | 2,500       | 800     | 650        | --      |
| Subtotal-----          | 56,810     | 119,250 | 279,350     | 257,700 | 217,330    | 167,300 |
| Divers:                |            |         |             |         |            |         |
| Scaup-----             | 64,850     | 43,550  | 280,800     | 325,700 | 263,750    | 223,400 |
| Canvasback-----        | --         | --      | 850         | 2,400   | 650        | 3,000   |
| Goldeneye-----         | 13,720     | 6,350   | 4,950       | 20,100  | 6,450      | 2,500   |
| Bufflehead-----        | 5,730      | 7,100   | 6,660       | 13,700  | 7,100      | 10,700  |
| Subtotal-----          | 84,300     | 57,000  | 293,260     | 361,900 | 277,950    | 239,600 |
| Miscellaneous:         |            |         |             |         |            |         |
| Scoter-----            | 28,500     | 14,950  | 202,600     | 138,700 | 82,500     | 66,800  |
| Eider-----             | --         | --      | 1,650       | --      | 28,370     | 10,700  |
| Oldsquaw-----          | 1,890      | --      | 46,200      | 44,200  | 38,700     | 25,000  |
| Subtotal-----          | 30,390     | 14,950  | 250,450     | 182,900 | 149,620    | 102,500 |
| Total-----             | 171,500    | 191,200 | 823,060     | 802,500 | 644,900    | 509,400 |

| Species                | Stratum V |         | Total     |           | Percent change |
|------------------------|-----------|---------|-----------|-----------|----------------|
|                        | 1961      | 1962    | 1961      | 1962      |                |
| Dabblers:              |           |         |           |           |                |
| Pintail-----           | 28,300    | 23,700  | 439,950   | 475,900   | +8             |
| Mallard-----           | 20,270    | 13,150  | 107,800   | 60,450    | -44            |
| American widgeon-----  | 3,830     | 4,220   | 41,470    | 41,670    | No change      |
| Shoveler-----          | 2,970     | 1,240   | 16,490    | 7,040     | -57            |
| Green-winged teal----- | 1,240     | --      | 4,390     | 1,550     | -65            |
| Subtotal-----          | 56,610    | 42,310  | 610,100   | 586,610   | -4             |
| Divers:                |           |         |           |           |                |
| Scaup-----             | 47,700    | 64,540  | 657,100   | 657,190   | No change      |
| Canvasback-----        | 4,820     | 1,240   | 6,320     | 6,640     | No change      |
| Goldeneye-----         | 870       | 3,600   | 25,990    | 32,550    | +25            |
| Bufflehead-----        | 11,500    | 7,320   | 30,990    | 38,820    | +25            |
| Subtotal-----          | 64,890    | 76,700  | 720,400   | 735,200   | +2             |
| Miscellaneous:         |           |         |           |           |                |
| Scoter-----            | 2,100     | 4,470   | 315,750   | 224,920   | -28            |
| Eider-----             | --        | --      | 30,020    | 10,700    | -64            |
| Oldsquaw-----          | --        | --      | 86,790    | 69,200    | -20            |
| Subtotal-----          | 2,100     | 4,470   | 432,560   | 304,820   | -30            |
| Total-----             | 123,600   | 123,480 | 1,763,060 | 1,626,630 | -8             |

Note: Does not include 620 gadwall and 1,250 mergansers.

TABLE E-4.--Waterfowl breeding population indexes in northern Alberta, northeastern British Columbia, Northwest Territories, and Yukon, 1961 and 1962

| Species                | Stratum |         |         |         |         |         |         |
|------------------------|---------|---------|---------|---------|---------|---------|---------|
|                        | 1.1     | 1.2     | 2       | 3       | 4       | 5       | 6       |
| <b>Ducks:</b>          |         |         |         |         |         |         |         |
| Dabblers:              |         |         |         |         |         |         |         |
| Pintail-----           | 15,800  | 5,400   | 26,600  | 12,700  | 31,400  | 4,000   | 600     |
| Mallard-----           | 164,800 | 83,100  | 70,300  | 63,600  | 24,400  | 112,900 | 10,200  |
| American widgeon-----  | 53,800  | 18,100  | 3,100   | 19,100  | 8,600   | 9,400   | 7,800   |
| Shoveler-----          | 22,100  | 12,600  | 7,800   | 3,200   | --      | 14,800  | 5,400   |
| Gadwall-----           | 3,200   | --      | 1,600   | --      | --      | --      | --      |
| Blue-winged teal-----  | 23,400  | 9,800   | 3,100   | 3,200   | --      | 1,300   | --      |
| Green-winged teal----- | 11,400  | 21,700  | 1,600   | 6,400   | 1,500   | 8,200   | 3,600   |
| Subtotal-----          | 294,500 | 150,700 | 114,100 | 108,200 | 65,900  | 150,600 | 27,600  |
| Divers:                |         |         |         |         |         |         |         |
| Scaup-----             | 151,800 | 104,800 | 15,600  | 330,700 | 111,400 | 41,700  | 110,400 |
| Canvasback-----        | 8,900   | --      | 6,200   | --      | --      | --      | --      |
| Redhead-----           | 31,600  | 12,600  | 6,200   | 3,200   | --      | --      | --      |
| Ring-necked duck-----  | 12,000  | 10,900  | 1,600   | 6,400   | 1,400   | 1,300   | 7,800   |
| Goldeneye-----         | 27,800  | 12,600  | 7,800   | 6,300   | 20,000  | --      | --      |
| Bufflehead-----        | 41,700  | 32,500  | 4,700   | 82,700  | 5,700   | 1,300   | 3,000   |
| Ruddy duck-----        | 1,900   | --      | --      | --      | --      | --      | --      |
| Subtotal-----          | 275,700 | 173,400 | 42,100  | 429,300 | 138,500 | 44,300  | 121,200 |
| Miscellaneous:         |         |         |         |         |         |         |         |
| Scooter and eider----- | 39,200  | 28,900  | --      | 89,000  | 61,400  | --      | 14,400  |
| Oldsquaw-----          | --      | --      | --      | 6,300   | 21,400  | --      | --      |
| Merganser-----         | 23,400  | 8,300   | --      | 3,200   | 15,700  | --      | 1,800   |
| Subtotal-----          | 62,600  | 37,200  | --      | 98,500  | 98,500  | --      | 16,200  |
| Total ducks-----       | 632,800 | 361,300 | 156,200 | 636,000 | 302,900 | 194,900 | 165,000 |
| Coots-----             | 11,700  | 2,000   | 2,700   | --      | --      | --      | --      |
| Geese:                 |         |         |         |         |         |         |         |
| Canada-----            | 10,400  | 4,900   | 800     | 3,200   | 400     | --      | --      |
| White-fronted-----     | --      | --      | --      | --      | --      | --      | --      |
| Swan-----              |         |         |         |         |         |         |         |

| Species                | Stratum |         |         |         | Total     |           | Percent change |
|------------------------|---------|---------|---------|---------|-----------|-----------|----------------|
|                        | 7       | 8       | 9       | 10      | 1961      | 1962      |                |
| <b>Ducks:</b>          |         |         |         |         |           |           |                |
| Dabblers:              |         |         |         |         |           |           |                |
| Pintail-----           | 12,100  | 41,700  | 26,900  | 5,600   | 522,000   | 182,800   | +65            |
| Mallard-----           | 18,600  | 17,000  | --      | 3,800   | 1,090,400 | 568,700   | -48            |
| American widgeon-----  | 20,800  | 27,700  | 7,700   | 6,100   | 345,800   | 182,200   | -47            |
| Shoveler-----          | 1,100   | 3,300   | --      | 400     | 156,900   | 70,700    | -55            |
| Gadwall-----           | 800     | --      | --      | --      | 4,500     | 5,600     | +24            |
| Blue-winged teal-----  | --      | --      | --      | --      | 90,200    | 40,800    | -55            |
| Green-winged teal----- | 1,900   | 500     | --      | 900     | 152,100   | 57,700    | -60            |
| Subtotal-----          | 55,300  | 90,200  | 34,600  | 16,800  | 2,361,900 | 1,108,500 | -53            |
| Divers:                |         |         |         |         |           |           |                |
| Scaup-----             | 389,600 | 40,900  | 59,600  | 34,500  | 1,682,300 | 1,391,000 | -17            |
| Canvasback-----        | 1,100   | 2,500   | --      | --      | 28,100    | 18,700    | -33            |
| Redhead-----           | --      | --      | --      | --      | 31,900    | 53,600    | +68            |
| Ring-necked duck-----  | --      | --      | --      | --      | 60,000    | 41,400    | -31            |
| Goldeneye-----         | 4,200   | 4,900   | 600     | 2,200   | 157,800   | 86,400    | -45            |
| Bufflehead-----        | 800     | --      | --      | --      | 141,800   | 172,400   | +22            |
| Ruddy duck-----        | --      | --      | --      | --      | 10,500    | 1,900     | -82            |
| Subtotal-----          | 395,700 | 48,300  | 60,200  | 36,700  | 2,112,400 | 1,765,400 | -16            |
| Miscellaneous:         |         |         |         |         |           |           |                |
| Scooter and eider----- | 205,000 | 16,400  | 70,600  | 52,400  | 1,065,600 | 577,300   | -46            |
| Oldsquaw-----          | 70,900  | --      | 35,300  | 10,600  | 211,800   | 144,500   | -32            |
| Merganser-----         | 6,800   | 1,400   | 600     | 900     | 142,100   | 62,100    | -56            |
| Subtotal-----          | 282,700 | 17,800  | 106,500 | 63,900  | 1,419,500 | 783,900   | -45            |
| Total ducks-----       | 733,700 | 156,300 | 201,300 | 117,400 | 5,893,800 | 3,657,800 | -38            |
| Coots-----             | --      | --      | --      | --      | 25,000    | 16,400    | -34            |
| Geese:                 |         |         |         |         |           |           |                |
| Canada-----            | 2,300   | --      | 3,200   | 300     | 39,700    | 25,500    | -36            |
| White-fronted-----     | --      | --      | 6,200   | --      | 8,700     | 6,200     | -29            |
| Swan-----              | 14,400  | 2,500   | 9,000   | 600     | 29,600    | 26,500    | -10            |

TABLE E-5.--Waterfowl breeding population indexes in northern Alberta, northeastern British Columbia, Northwest Territories, and Yukon, 1961-1962

| Species                | 1955      | 1956      | 1957      | 1958      | 1959      | 1960      | 1961      | 1962      |
|------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Ducks:                 |           |           |           |           |           |           |           |           |
| Dabblers:              |           |           |           |           |           |           |           |           |
| Pintail-----           | 99,400    | 277,700   | 302,300   | 453,200   | 1,002,500 | 352,980   | 522,000   | 182,800   |
| Mallard-----           | 276,200   | 466,000   | 498,400   | 776,900   | 1,254,700 | 417,800   | 1,090,400 | 568,700   |
| American widgeon-----  | 213,600   | 301,100   | 261,500   | 205,000   | 426,700   | 329,400   | 345,800   | 182,200   |
| Shoveler-----          | 20,400    | 41,800    | 42,700    | 100,300   | 187,600   | 77,320    | 156,900   | 70,700    |
| Gadwall-----           | 2,000     | --        | 2,600     | 1,700     | 2,700     | 1,880     | 4,500     | 5,600     |
| Blue-winged teal-----  | 10,400    | 9,000     | 6,200     | 47,700    | 105,300   | 65,450    | 90,200    | 40,800    |
| Green-winged teal----- | 74,200    | 107,600   | 70,400    | 122,200   | 281,100   | 144,040   | 152,100   | 57,700    |
| Subtotal-----          | 696,200   | 1,203,200 | 1,184,100 | 1,707,000 | 3,260,600 | 1,388,870 | 2,361,900 | 1,108,500 |
| Divers:                |           |           |           |           |           |           |           |           |
| Scaup-----             | 1,084,100 | 1,219,100 | 1,120,300 | 1,304,800 | 2,055,800 | 1,448,190 | 1,682,300 | 1,391,000 |
| Canvasback-----        | 28,000    | 20,800    | 18,500    | 80,900    | 60,900    | 52,330    | 28,100    | 18,700    |
| Redhead-----           | 27,100    | 22,000    | 25,000    | 13,900    | 77,800    | 29,420    | 31,900    | 53,600    |
| Ring-necked duck-----  | 16,900    | 54,800    | 40,400    | 42,400    | 130,700   | 76,410    | 60,000    | 41,400    |
| Goldeneye-----         | 81,900    | 32,900    | 57,300    | 233,900   | 245,400   | 50,210    | 157,800   | 86,400    |
| Bufflehead-----        | 151,800   | 120,700   | 92,500    | 120,700   | 206,000   | 159,330   | 141,800   | 172,400   |
| Ruddy duck-----        | 1,900     | --        | 6,200     | 12,700    | 27,100    | 8,650     | 10,500    | 1,900     |
| Subtotal-----          | 1,391,700 | 1,470,300 | 1,360,200 | 1,809,300 | 2,803,700 | 1,824,540 | 2,112,400 | 1,765,400 |
| Miscellaneous:         |           |           |           |           |           |           |           |           |
| Scoter-----            | 665,600   | 812,200   | 859,400   | 752,000   | 1,299,700 | 1,266,540 | 1,065,600 | 577,300   |
| Oldsquaw-----          | 100,700   | 130,100   | 105,400   | 207,300   | 284,800   | 187,800   | 211,800   | 144,500   |
| Merganser-----         | 87,800    | 169,700   | 179,600   | 155,400   | 145,900   | 130,170   | 142,100   | 62,100    |
| Subtotal-----          | 854,100   | 1,112,000 | 1,144,400 | 1,114,700 | 1,730,400 | 1,584,510 | 1,419,500 | 783,900   |
| Total ducks-----       | 2,087,900 | 3,785,500 | 3,688,700 | 4,631,000 | 7,794,700 | 4,797,920 | 5,893,800 | 3,657,800 |
| Coots-----             | ?         | ?         | ?         | ?         | ?         | 24,300    | 25,000    | 16,400    |
| Geese:                 |           |           |           |           |           |           |           |           |
| Canada-----            | ?         | 63,300    | 21,000    | 52,400    | 93,300    | 45,300    | 39,700    | 25,500    |
| White-fronted-----     | ?         | 7,800     | 7,800     | 800       | 10,000    | 7,200     | 8,700     | 6,200     |
| Swan-----              | ?         | 15,050    | 11,400    | 13,300    | 45,400    | 23,600    | 29,600    | 26,500    |

TABLE E-6.--Waterfowl breeding population indices, by species, southern Alberta, 1961 and 1962

[Index numbers, in thousands]

| Species            | Stratum A |      |                | Stratum B |       |                | Stratum C |      |                | Total |       |                |
|--------------------|-----------|------|----------------|-----------|-------|----------------|-----------|------|----------------|-------|-------|----------------|
|                    | 1961      | 1962 | Percent change | 1961      | 1962  | Percent change | 1961      | 1962 | Percent change | 1961  | 1962  | Percent change |
| Ducks:             |           |      |                |           |       |                |           |      |                |       |       |                |
| Dabblers:          |           |      |                |           |       |                |           |      |                |       |       |                |
| Pintail-----       | 115       | 83   | -28            | 132       | 74    | -44            | 36        | 82   | +126           | 283   | 239   | -16            |
| Mallard-----       | 206       | 159  | -23            | 581       | 463   | -20            | 60        | 108  | +79            | 847   | 730   | -14            |
| American widgeon-- | 46        | 32   | -32            | 128       | 78    | -39            | 12        | 18   | +50            | 186   | 127   | -32            |
| Shoveller-----     | 47        | 23   | -51            | 109       | 87    | -20            | 11        | 13   | +20            | 167   | 123   | -26            |
| Gadwall-----       | 21        | 14   | -34            | 84        | 68    | -19            | 3         | 6    | +88            | 108   | 88    | -19            |
| Blue-winged teal-- | 35        | 14   | -61            | 125       | 41    | -67            | 10        | 5    | -46            | 170   | 60    | -65            |
| Green-winged teal- | 17        | 1    | -92            | 44        | 11    | -75            | 3         | 1    | -64            | 64    | 14    | -79            |
| Cinnamon teal----- | --        | --   | --             | --        | --    | --             | Trace     | --   | --             | Trace | Trace | --             |
| Subtotal-----      | 487       | 326  | -33            | 1,213     | 822   | -32            | 135       | 233  | +73            | 1,825 | 1,381 | -24            |
| Divers:            |           |      |                |           |       |                |           |      |                |       |       |                |
| Scaup-----         | 45        | 30   | -34            | 169       | 158   | -7             | 34        | 29   | -17            | 248   | 216   | -13            |
| Canvasback-----    | 5         | 10   | +98            | 32        | 27    | -16            | --        | 2    | +200           | 37    | 38    | +3             |
| Redhead-----       | 6         | 2    | -61            | 31        | 17    | -44            | 3         | 2    | -50            | 40    | 21    | -47            |
| Ring-necked duck-- | Trace     | --   | --             | 1         | 1     | 0              | --        | --   | --             | 1     | 1     | 0              |
| Goldeneye-----     | 1         | --   | -100           | 2         | 2     | 0              | --        | --   | --             | 3     | 2     | -38            |
| Bufflehead-----    | 1         | 1    | 0              | 30        | 11    | -63            | 1         | --   | --             | 32    | 12    | -63            |
| Ruddy duck-----    | 1         | --   | -100           | 14        | 17    | +21            | 3         | 2    | -56            | 18    | 21    | +10            |
| Subtotal-----      | 59        | 43   | -27            | 279       | 233   | -16            | 41        | 35   | -15            | 379   | 311   | -18            |
| Miscellaneous:     |           |      |                |           |       |                |           |      |                |       |       |                |
| Scoter-----        | 1         | 2    | +100           | 43        | 46    | +7             | Trace     | --   | --             | 44    | 47    | +7             |
| Total ducks-----   | 547       | 371  | -32            | 1,525     | 1,101 | -28            | 176       | 268  | +52            | 2,248 | 1,739 | -23            |
| Coots-----         | 23        | 4    | -83            | 60        | 13    | -78            | 14        | 6    | -57            | 97    | 23    | -76            |

TABLE E-7.--Trend in waterfowl breeding populations by species, southern Alberta, 1953-62

[Index numbers, in thousands]

| Species                | 1953               | 1954               | 1955               | 1956  | 1957  | 1958  | 1959  | 1960  | 1961  | 1962  |
|------------------------|--------------------|--------------------|--------------------|-------|-------|-------|-------|-------|-------|-------|
| Ducks:                 |                    |                    |                    |       |       |       |       |       |       |       |
| Dabblers:              |                    |                    |                    |       |       |       |       |       |       |       |
| Pintail-----           | 781                | 677                | 784                | 707   | 595   | 651   | 568   | 620   | 284   | 239   |
| Mallard-----           | 837                | 879                | 970                | 903   | 1,038 | 1,194 | 1,295 | 997   | 848   | 730   |
| American widgeon-----  | 180                | 177                | 177                | 157   | 157   | 179   | 254   | 221   | 187   | 127   |
| Shoveller-----         | 156                | 174                | 172                | 171   | 155   | 217   | 204   | 238   | 167   | 123   |
| Gadwall-----           | 20                 | 60                 | 62                 | 85    | 61    | 79    | 127   | 140   | 109   | 88    |
| Blue-winged teal-----  | 66                 | 174                | 217                | 134   | 134   | 174   | 189   | 165   | 169   | 60    |
| Green-winged teal----- | 10                 | 63                 | 55                 | 27    | 31    | 34    | 72    | 55    | 64    | 14    |
| Cinnamon teal-----     | 2                  | Trace              | --                 | --    | --    | Trace | 1     | Trace | Trace | Trace |
| Subtotal-----          | 2,052              | 2,204              | 2,437              | 2,184 | 2,171 | 2,528 | 2,710 | 2,436 | 1,828 | 1,381 |
| Divers:                |                    |                    |                    |       |       |       |       |       |       |       |
| Scaup-----             | 129                | 199                | 249                | 267   | 327   | 309   | 326   | 249   | 249   | 216   |
| Canvasback-----        | 35                 | 52                 | 48                 | 53    | 54    | 94    | 52    | 40    | 37    | 38    |
| Redhead-----           | 42                 | 48                 | 60                 | 59    | 45    | 63    | 57    | 40    | 40    | 21    |
| Ring-necked duck-----  | --                 | --                 | Trace              | 4     | --    | 1     | 4     | 2     | 2     | 1     |
| Goldeneye-----         | 1                  | 4                  | 5                  | 6     | 5     | 3     | 3     | 3     | 3     | 2     |
| Bufflehead-----        | 9                  | 13                 | 13                 | 16    | 17    | 21    | 27    | 22    | 32    | 12    |
| Ruddy duck-----        | 13                 | 13                 | 21                 | 20    | 12    | 16    | 33    | 32    | 19    | 21    |
| Subtotal-----          | 229                | 329                | 396                | 425   | 460   | 507   | 502   | 388   | 382   | 311   |
| Miscellaneous:         |                    |                    |                    |       |       |       |       |       |       |       |
| Scoter-----            | --                 | --                 | --                 | 41    | 26    | 32    | 56    | 35    | 43    | 47    |
| Total ducks-----       | <sup>1</sup> 2,281 | <sup>1</sup> 2,533 | <sup>1</sup> 2,833 | 2,650 | 2,657 | 3,067 | 3,268 | 2,859 | 2,253 | 1,739 |
| Coots-----             | 92                 | 168                | 100                | 81    | 44    | 74    | 131   | 88    | 97    | 23    |

<sup>1</sup> Scoter not included.

TABLE E-8.--Aerial counts of Canada goose breeding pairs and grouped birds, Idaho, 1956-62

| Area                                   | 1956  | 1957  | 1958  | 1959  | 1960  | 1961  | 1962  |
|--|-------|-------|-------|-------|-------|-------|-------|
| Snake River drainage:                  |       |       |       |       |       |       |       |
| Farewell Bend to railroad bridge-----  | 781   | 1,196 | 1,184 | 1,146 | 1,322 | 1,223 | 1,420 |
| Payette River (mouth to Emmett)-----   | 239   | 341   | 345   | 284   | 430   | 308   | 409   |
| Strike Dam to American Falls Dam-----  | 209   | 130   | 245   | 148   | 126   | 199   | 224   |
| North Fork, including Island Park----- | 217   | 280   | 348   | 371   | 404   | 473   | 329   |
| South Fork-----                        | 101   | 116   | 143   | 176   | 204   | 222   | 143   |
| Mid Lake - Camas Refuge area-----      | 235   | 213   | 285   | 298   | 257   | 313   | 297   |
| Gray's Lake area-----                  | 282   | 446   | 426   | 401   | 561   | 596   | 516   |
| Blackfoot Reservoir area-----          | 446   | 411   | 507   | 444   | 512   | 580   | 395   |
| Subtotal-----                          | 2,510 | 3,133 | 3,483 | 3,268 | 3,816 | 3,914 | 3,733 |
| Bear River and drainage:               |       |       |       |       |       |       |       |
| Dingle Marsh area-----                 | 477   | 714   | 1,054 | 1,150 | 903   | 1,418 | 1,077 |
| Total-----                             | 2,987 | 3,847 | 4,537 | 4,418 | 4,719 | 5,332 | 4,810 |

TABLE E-9.--Waterfowl nesting-pair count on key production areas, Nevada, 1959-62

| Species            | Total |       |       | 1962  |
|--------------------|-------|-------|-------|-------|
|                    | 1959  | 1960  | 1961  |       |
| Ducks:             |       |       |       |       |
| Dabblers:          |       |       |       |       |
| Pintail-----       | 336   | 231   | 292   | 241   |
| Mallard-----       | 1,500 | 963   | 913   | 715   |
| Shovelers-----     | 84    | 165   | 101   | 63    |
| Gadwall-----       | 1,015 | 380   | 398   | 383   |
| Cinnamon teal----- | 1,970 | 485   | 422   | 588   |
| Subtotal-----      | 4,905 | 2,224 | 2,126 | 1,990 |
| Divers:            |       |       |       |       |
| Canvasback-----    | 100   | 275   | 204   | 75    |
| Redhead-----       | 2,742 | 942   | 612   | 663   |
| Ruddy duck-----    | 430   | 204   | 108   | 100   |
| Subtotal-----      | 3,272 | 1,421 | 924   | 838   |
| Other ducks-----   | 52    | 178   | 117   | 116   |
| Total ducks-----   | 8,229 | 3,823 | 3,167 | 2,944 |
| Canada goose-----  | 396   | 418   | 363   | 461   |

TABLE E-10.--Trend in duck numbers, Utah, 1957-62

|  | Route flown      |              |              |                    |                  |             |       |
|--|------------------|--------------|--------------|--------------------|------------------|-------------|-------|
|  | Box Elder County | Weber County | Davis County | Jordan River Clubs | Salt Lake County | Utah County | Total |
| Area sampled (sq.mi.)-----             | 48.0             | 15.5         | 14.2         | 6.2                | 6.7              | 18.0        | 108.6 |
| Ducks:                                 |                  |              |              |                    |                  |             |       |
| Number counted:                        |                  |              |              |                    |                  |             |       |
| 1957-----                              | 962              | 416          | 313          | 402                | 64               | 113         | 2,270 |
| 1958-----                              | 2,070            | 483          | 342          | 400                | 76               | 284         | 3,655 |
| 1959-----                              | 1,671            | 573          | 466          | 488                | 55               | 231         | 3,484 |
| 1960-----                              | 2,458            | 766          | 791          | 646                | 76               | 515         | 5,252 |
| 1961-----                              | 2,119            | 732          | 478          | 320                | 29               | 864         | 4,542 |
| 1962-----                              | 1,931            | 843          | 583          | 503                | 28               | 286         | 4,174 |
| Number per square mile:                |                  |              |              |                    |                  |             |       |
| 1957-----                              | 20.0             | 26.8         | 22.0         | 64.8               | 9.6              | 6.3         | 20.9  |
| 1958-----                              | 43.1             | 31.8         | 24.1         | 64.5               | 11.3             | 15.7        | 33.7  |
| 1959-----                              | 34.8             | 37.0         | 32.8         | 78.7               | 8.2              | 12.8        | 32.1  |
| 1960-----                              | 51.2             | 49.4         | 55.7         | 104.2              | 11.3             | 28.6        | 48.0  |
| 1961-----                              | 44.1             | 47.2         | 33.7         | 51.6               | 4.3              | 48.0        | 41.8  |
| 1962-----                              | 40.2             | 54.4         | 41.1         | 81.1               | 4.2              | 15.9        | 38.4  |
| Percent change, 1962 from<br>1961----- | -9               | +15          | +22          | +57                | 00               | -67         | -8    |

TABLE E-11.--Trends in dike line breeding pair counts of waterfowl on four State refuges, Utah, 1957-1962

| Species                | 1957  | 1958  | 1959  | 1960  | 1961  | 1962  |
|------------------------|-------|-------|-------|-------|-------|-------|
| Ducks:                 |       |       |       |       |       |       |
| Dabblers:              |       |       |       |       |       |       |
| Shoveler-----          | 189   | 294   | 289   | 428   | 314   | 418   |
| Mallard-----           | 564   | 739   | 696   | 910   | 855   | 731   |
| Gadwall-----           | 278   | 331   | 316   | 407   | 426   | 493   |
| Pintail-----           | 183   | 527   | 459   | 516   | 453   | 469   |
| Cinnamon teal-----     | 585   | 540   | 607   | 830   | 700   | 637   |
| Blue-winged teal-----  | 52    | 78    | 95    | 119   | 52    | 53    |
| Green-winged teal----- | 33    | 23    | 32    | 13    | 70    | 50    |
| American widgeon-----  | 3     | 5     | 12    | 2     | 16    | 19    |
| Subtotal-----          | 1,887 | 2,537 | 2,506 | 3,225 | 2,886 | 2,870 |
| Divers:                |       |       |       |       |       |       |
| Redhead-----           | 777   | 930   | 1,056 | 1,283 | 1,183 | 1,556 |
| Canvasback-----        | --    | --    | 1     | --    | --    | 1     |
| Scaup-----             | 4     | 3     | 9     | 2     | 20    | 38    |
| Goldeneye-----         | 1     | --    | --    | --    | --    | 1     |
| Bufflehead-----        | --    | 1     | 4     | --    | --    | --    |
| Subtotal-----          | 782   | 934   | 1,070 | 1,285 | 1,203 | 1,596 |
| Miscellaneous:         |       |       |       |       |       |       |
| Ruddy duck-----        | 200   | 192   | 272   | 329   | 290   | 295   |
| Total ducks-----       | 2,869 | 3,663 | 3,848 | 4,389 | 4,379 | 4,761 |
| Canada goose-----      | 132   | 157   | 147   | 152   | 161   | 160   |

TABLE E-12.--Trend in waterfowl breeding populations, by species, southern Saskatchewan, May 1953-62

[Index numbers, in thousands]

| Species                | 1953  | 1954  | 1955  | 1956  | 1957  | 1958  | 1959  | 1960  | 1961  | 1962  |
|------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Ducks:                 |       |       |       |       |       |       |       |       |       |       |
| Dabblers:              |       |       |       |       |       |       |       |       |       |       |
| Pintail-----           | 1,335 | 1,275 | 1,774 | 1,970 | 1,185 | 789   | 384   | 600   | 258   | 142   |
| Mallard-----           | 1,958 | 1,912 | 2,032 | 2,473 | 2,274 | 3,165 | 1,856 | 1,656 | 1,141 | 629   |
| American widgeon-----  | 185   | 182   | 236   | 301   | 204   | 276   | 182   | 143   | 93    | 19    |
| Shoveler-----          | 255   | 289   | 352   | 390   | 309   | 213   | 167   | 303   | 116   | 15    |
| Gadwall-----           | 77    | 85    | 108   | 111   | 125   | 54    | 72    | 71    | 36    | 27    |
| Blue-winged teal-----  | 133   | 264   | 376   | 384   | 310   | 207   | 153   | 134   | 102   | 24    |
| Green-winged teal----- | 21    | 19    | 52    | 62    | 33    | 24    | 18    | 30    | 12    | 2     |
| Subtotal-----          | 3,964 | 4,026 | 4,930 | 5,691 | 4,440 | 4,728 | 2,832 | 2,937 | 1,758 | 859   |
| Divers:                |       |       |       |       |       |       |       |       |       |       |
| Scaup-----             | 209   | 210   | 460   | 552   | 455   | 214   | 162   | 157   | 159   | 132   |
| Canvasback-----        | 253   | 167   | 178   | 223   | 215   | 158   | 64    | 63    | 69    | 41    |
| Redhead-----           | 85    | 73    | 85    | 153   | 112   | 59    | 41    | 47    | 26    | 22    |
| Ring-necked duck-----  | 1     | 6     | 20    | 9     | 4     | 6     | 31    | 7     | 4     | --    |
| Goldeneye-----         | 1     | 8     | 5     | 16    | 8     | 5     | 4     | 6     | 3     | 1     |
| Bufflehead-----        | 8     | 4     | 9     | 7     | 16    | 6     | 12    | 10    | 13    | --    |
| Ruddy duck-----        | 18    | 15    | 48    | 47    | 34    | 12    | 18    | 14    | 1     | 14    |
| Subtotal-----          | 575   | 483   | 805   | 1,007 | 844   | 460   | 332   | 304   | 375   | 210   |
| Miscellaneous:         |       |       |       |       |       |       |       |       |       |       |
| Scoter-----            | 47    | 75    | 9     | 16    | 1     | 5     | 7     | 6     | 4     | --    |
| Other-----             | --    | --    | --    | --    | 2     | --    | 1     | 7     | 1     | --    |
| Subtotal-----          | 47    | 75    | 9     | 16    | 3     | 5     | 8     | 13    | 5     | --    |
| Total ducks-----       | 4,586 | 4,584 | 5,744 | 6,714 | 5,287 | 5,193 | 3,172 | 3,254 | 2,038 | 1,069 |
| Coots-----             | 152   | 140   | 202   | 306   | 242   | 74    | 82    | 66    | 31    | 14    |

TABLE E-13.--Waterfowl breeding populations, by species and stratum, southern Saskatchewan, May 1961 and 1962

[Index numbers, in thousands]

| Species                | Stratum |        |        |        |    | Total |       | Average<br>1949-60 | Percent change<br>from-- |         |
|------------------------|---------|--------|--------|--------|----|-------|-------|--------------------|--------------------------|---------|
|                        | A-East  | A-West | B-East | B-West | C  | 1961  | 1962  |                    | 1961                     | Average |
| <b>Ducks:</b>          |         |        |        |        |    |       |       |                    |                          |         |
| Dabblers:              |         |        |        |        |    |       |       |                    |                          |         |
| Pintail-----           | 18      | 40     | 80     | 2      | 2  | 258   | 142   | 1,067              | -45                      | -87     |
| Mallard-----           | 94      | 104    | 275    | 97     | 58 | 1,141 | 628   | 1,758              | -45                      | -64     |
| American widgeon-----  | 4       | 4      | 2      | 8      | -- | 93    | 18    | 200                | -81                      | -91     |
| Shoveler-----          | 6       | 3      | 1      | 5      | -- | 116   | 15    | 263                | -87                      | -56     |
| Gadwall-----           | 6       | 8      | 3      | 10     | -- | 36    | 27    | 85                 | -25                      | -68     |
| Blue-winged teal-----  | 16      | 4      | --     | 4      | -- | 102   | 24    | 218                | -76                      | -84     |
| Green-winged teal----- | --      | 2      | --     | --     | -- | 12    | 2     | 30                 | -67                      | -93     |
| Subtotal-----          | 144     | 165    | 361    | 126    | 60 | 1,758 | 856   | 3,621              | -51                      | -76     |
| Divers:                |         |        |        |        |    |       |       |                    |                          |         |
| Scap-----              | 6       | 5      | 58     | 62     | -- | 159   | 131   | 244                | -18                      | -46     |
| Canvasback-----        | 4       | 5      | 4      | 27     | -- | 69    | 40    | 140                | -42                      | -71     |
| Redhead-----           | 1       | --     | 3      | 18     | -- | 26    | 22    | 64                 | -15                      | -66     |
| Ring-necked duck-----  | --      | --     | --     | --     | -- | 4     | --    | 8                  | -100                     | -100    |
| Goldeneye-----         | --      | --     | --     | 1      | -- | 3     | 1     | 8                  | -67                      | -88     |
| Bufflehead-----        | --      | --     | --     | Trace  | -- | 13    | --    | 10                 | -100                     | -100    |
| Ruddy duck-----        | --      | 4      | --     | 10     | -- | 1     | 14    | 24                 | +987                     | -42     |
| Subtotal-----          | 11      | 14     | 65     | 118    | -- | 275   | 208   | 498                | -24                      | -58     |
| Miscellaneous:         |         |        |        |        |    |       |       |                    |                          |         |
| Scoter-----            | --      | --     | --     | --     | -- | 4     | --    | 29                 | -100                     | -100    |
| Merganser-----         | --      | --     | --     | --     | -- | 1     | --    | Trace              | --                       | --      |
| Subtotal-----          | --      | --     | --     | --     | -- | 5     | --    | 29                 | --                       | --      |
| Total ducks-----       | 155     | 179    | 426    | 244    | 60 | 2,038 | 1,064 | 4,148              | -48                      | -74     |
| Coots-----             | 5       | 4      | 3      | 2      | 1  | 31    | 15    | 128                | -52                      | -88     |

TABLE E-14.--Duck breeding populations, Montana, 1961 and 1962

|                             | Sheridan<br>County | Hi-Line |         | Great Falls-<br>Piedmont | Total   |
|-----------------------------|--------------------|---------|---------|--------------------------|---------|
|                             |                    | Eastern | Central |                          |         |
| Total area (sq. mi.)-----   | 1,440              | 7,926   | 9,468   | 7,020                    | 25,854  |
| Area sampled (sq. mi.)----- | 38                 | 172     | 94      | 143                      | 447     |
| Ducks per sq. mi.:          |                    |         |         |                          |         |
| 13 year average-----        | 27.3               | 5.1     | 10.8    | 8.4                      | --      |
| 1961-----                   | 24.3               | 6.6     | 10.5    | 4.9                      | --      |
| 1962-----                   | 14.1               | 3.7     | 9.1     | 10.0                     | --      |
| Population index:           |                    |         |         |                          |         |
| 1961-----                   | 34,992             | 52,312  | 99,414  | 34,398                   | 221,106 |
| 1962-----                   | 20,304             | 29,326  | 86,159  | 70,200                   | 205,989 |
| Percent change, 1962 from:  |                    |         |         |                          |         |
| 1961-----                   | -42                | -44     | -13     | +104                     | -7      |

TABLE E-15.--Number and species composition of waterfowl, Flathead Valley waterfowl breeding-ground survey, Montana, 1960-62

| Species                 | Number seen in-- |      |      |
|-------------------------|------------------|------|------|
|                         | 1960             | 1961 | 1962 |
| Ducks:                  |                  |      |      |
| Dabblers:               |                  |      |      |
| Pintail-----            | 9                | 7    | 8    |
| Mallard-----            | 100              | 109  | 179  |
| American widgeon-----   | 8                | 14   | 12   |
| Shoveler-----           | 45               | 17   | 14   |
| Gadwall-----            | 18               | 21   | 38   |
| Teal <sup>1</sup> ----- | 115              | 87   | 57   |
| Subtotal-----           | 295              | 255  | 308  |
| Divers:                 |                  |      |      |
| Scaup-----              | 6                | 7    | 13   |
| Redhead-----            | 190              | 182  | 159  |
| American goldeneye----- | 1                | 2    | 4    |
| Barrows goldeneye-----  | 1                | 0    | 0    |
| Ruddy duck-----         | 21               | 39   | 41   |
| Subtotal-----           | 219              | 230  | 217  |
| Total ducks-----        | 514              | 485  | 525  |
| Coots-----              | 133              | 148  | 143  |
| Grand total-----        | 647              | 633  | 668  |

<sup>1</sup> Includes blue-winged, green-winged, and cinnamon teal.

TABLE E-16.--Canada goose breeding population by areas, Montana, 1961-62

|                                     | Hi-Line | Helena | East slope |
|-------------------------------------|---------|--------|------------|
| Pairs:                              |         |        |            |
| 1961-----                           | 395     | 103    | 64         |
| 1962-----                           | 548     | --     | 65         |
| Singles:                            |         |        |            |
| 1961-----                           | 81      | 47     | 18         |
| 1962-----                           | 74      | --     | 14         |
| Groups:                             |         |        |            |
| 1961-----                           | 68      | 58     | 15         |
| 1962-----                           | 173     | --     | 20         |
| Total:                              |         |        |            |
| 1961-----                           | 939     | 311    | 161        |
| 1962-----                           | 1,339   | 307    | 164        |
| Percent change, 1962 from 1961----- | +43     | -10    | -2         |

TABLE E-17.--Waterfowl breeding populations, by species and stratum, North Dakota, South Dakota, and western Minnesota, 1961 and 1962

[Index numbers, in thousands]

| Species                | Stratum |         |      | Total |       | Percent change |  |
|------------------------|---------|---------|------|-------|-------|----------------|--|
|                        | East    | Central | West | 1961  | 1962  |                |  |
| <b>Ducks:</b>          |         |         |      |       |       |                |  |
| Dabblers:              |         |         |      |       |       |                |  |
| Pintail-----           | 62      | 182     | 29   | 135   | 273   | +102           |  |
| Mallard-----           | 62      | 174     | 80   | 255   | 316   | +24            |  |
| American widgeon-----  | 2       | 3       | 1    | 7     | 6     | -14            |  |
| Shoveler-----          | 70      | 107     | 7    | 57    | 184   | +223           |  |
| Gadwall-----           | 9       | 62      | 2    | 30    | 73    | +137           |  |
| Blue-winged teal-----  | 94      | 97      | 12   | 164   | 203   | +24            |  |
| Green-winged teal----- | --      | 3       | --   | 2     | 3     | +50            |  |
| Subtotal-----          | 299     | 628     | 131  | 650   | 1,058 | +63            |  |
| Divers:                |         |         |      |       |       |                |  |
| Scaup-----             | 9       | 22      | 1    | 27    | 32    | +19            |  |
| Canvasback-----        | 2       | 3       | --   | 8     | 5     | -38            |  |
| Redhead-----           | 5       | 22      | --   | 9     | 27    | +200           |  |
| Ring-necked duck-----  | --      | --      | --   | 2     | --    | --             |  |
| Ruddy duck-----        | 3       | 6       | --   | 6     | 9     | +50            |  |
| Subtotal-----          | 19      | 53      | 1    | 52    | 73    | +40            |  |
| Total ducks-----       | 318     | 681     | 132  | 702   | 1,131 | +61            |  |
| Coots-----             | 73      | 56      | --   | 93    | 129   | +39            |  |

TABLE E-18.--Waterfowl breeding populations, North Dakota, South Dakota, and western Minnesota, 1958-62

[Index numbers, in thousands]

| Species                | 1958 | 1959 | 1960  | 1961 | 1962  |
|------------------------|------|------|-------|------|-------|
| <b>Ducks:</b>          |      |      |       |      |       |
| Dabblers:              |      |      |       |      |       |
| Pintail-----           | 217  | 22   | 201   | 135  | 273   |
| Mallard-----           | 420  | 166  | 206   | 255  | 315   |
| American widgeon-----  | 12   | 29   | 10    | 7    | 6     |
| Shoveler-----          | 58   | 21   | 86    | 57   | 184   |
| Gadwall-----           | 30   | 7    | 32    | 30   | 73    |
| Blue-winged teal-----  | 165  | 127  | 154   | 164  | 203   |
| Green-winged teal----- | 1    | --   | --    | 2    | 3     |
| Subtotal-----          | 903  | 372  | 689   | 650  | 1,057 |
| Divers:                |      |      |       |      |       |
| Scaup-----             | 8    | 25   | 44    | 27   | 31    |
| Canvasback-----        | 25   | 10   | 9     | 8    | 5     |
| Redhead-----           | 9    | 2    | 24    | 9    | 28    |
| Ring-necked duck-----  | --   | --   | Trace | 2    | --    |
| Ruddy duck-----        | 8    | 4    | 15    | 6    | 9     |
| Subtotal-----          | 50   | 41   | 92    | 52   | 73    |
| Total ducks-----       | 953  | 413  | 781   | 702  | 1,130 |
| Coots-----             | 30   | 88   | 80    | 93   | 129   |

TABLE E-19.--Waterfowl breeding populations, by species, North Dakota, 1948-62  
[Index numbers]

| Species                | 1948-61<br>Average  | 1962    | 1961    | Percent change from: |      | Percent species<br>composition, 1962 |
|------------------------|---------------------|---------|---------|----------------------|------|--------------------------------------|
|                        |                     |         |         | Average              | 1961 |                                      |
| <b>Ducks:</b>          |                     |         |         |                      |      |                                      |
| Dabblers:              |                     |         |         |                      |      |                                      |
| Pintail-----           | 257,390             | 157,661 | 155,300 | -39                  | +2   | 17.7                                 |
| Mallard-----           | 154,258             | 118,669 | 129,500 | -23                  | -8   | 13.3                                 |
| American widgeon-----  | 20,345              | 17,182  | 28,700  | -16                  | -40  | 1.9                                  |
| Shoveler-----          | 98,809              | 114,484 | 112,200 | +16                  | +2   | 12.9                                 |
| Gadwall-----           | 75,180              | 96,324  | 150,700 | +23                  | -36  | 10.8                                 |
| Blue-winged teal-----  | 322,801             | 266,092 | 303,300 | -18                  | -12  | 29.9                                 |
| Green-winged teal----- | 4,199               | 14,778  | 10,900  | +252                 | +35  | 1.7                                  |
| Subtotal-----          | 935,982             | 785,190 | 890,600 | -16                  | -12  | 88.1                                 |
| Divers:                |                     |         |         |                      |      |                                      |
| Scaup-----             | <sup>1</sup> 29,594 | 28,666  | 36,300  | -3                   | -21  | 3.2                                  |
| Canvasback-----        | 26,714              | 16,647  | 21,200  | -38                  | -21  | 1.9                                  |
| Redhead-----           | 32,255              | 31,069  | 34,800  | -4                   | -11  | 3.5                                  |
| Ruddy duck-----        | 12,929              | 23,235  | 8,000   | +80                  | +189 | 2.6                                  |
| Subtotal-----          | 101,492             | 99,707  | 100,300 | -2                   | 00   | 11.3                                 |
| Miscellaneous:         |                     |         |         |                      |      |                                      |
| Others-----            | 1,176               | 5,430   | 2,400   | +362                 | +126 | .6                                   |
| Total ducks-----       | 1,038,650           | 890,327 | 993,300 | -14                  | -10  | 100.0                                |

<sup>1</sup> The 1955 index for scaup omitted; considered erroneous due to delayed departure of migrating scaup from State that year.

TABLE E-20.--Ratios of lone to paired drakes during breeding population surveys, North Dakota, 1956-62

| Year      | Pintail | Mallard | Canvasback          | Blue-winged teal |
|-----------|---------|---------|---------------------|------------------|
| 1956----- | 199:100 | 125:100 | 111:100             | 37:100           |
| 1957----- | 259:100 | 172:100 | 235:100             | 55:100           |
| 1958----- | 161:100 | 129:100 | 105:100             | 44:100           |
| 1959----- | 218:100 | 121:100 | <sup>1</sup> 12:100 | 55:100           |
| 1960----- | 294:100 | 169:100 | 90:100              | 61:100           |
| 1961----- | 193:100 | 93:100  | 43:100              | 37:100           |
| 1962----- | 220:100 | 118:100 | 96:100              | 67:100           |

<sup>1</sup> May be due to sampling error.

TABLE E-21.--Waterfowl breeding population survey data, South Dakota, 1950-62

|                                     | Population index | Number per square mile |
|-------------------------------------|------------------|------------------------|
| Ducks:                              |                  |                        |
| 1961:                               |                  |                        |
| Stratum 1-----                      | 123,500          | 5.75                   |
| Stratum 2-----                      | 237,300          | 13.18                  |
| Stratum 3-----                      | 97,200           | 3.66                   |
| Total-----                          | 558,000          | 7.58                   |
| 1961-----                           | 310,500          | 4.22                   |
| Average, 1950-61-----               | 543,000          | 7.37                   |
| Percent change, 1962 from 1961----- | +80              | --                     |
| Average-----                        | +3               | --                     |
| Coots:                              |                  |                        |
| 1962-----                           | 32,400           | .44                    |
| 1961-----                           | 7,700            | .10                    |
| Percent change-----                 | +320             | --                     |

TABLE E-22.--Duck breeding population indexes, Nebraska, 1961 and 1962

| Species <sup>1</sup>   | Statewide |        |                |
|------------------------|-----------|--------|----------------|
|                        | 1961      | 1962   | Percent change |
| Dabblers:              |           |        |                |
| Pintail-----           | 15,540    | 7,218  | -54            |
| Mallard-----           | 28,055    | 16,003 | -43            |
| American widgeon-----  | 2,374     | 335    | -86            |
| Shoveler-----          | 15,658    | 8,156  | -48            |
| Gadwall-----           | 8,277     | 11,398 | +38            |
| Blue-winged teal-----  | 65,033    | 23,243 | -64            |
| Green-winged teal----- | 568       | 904    | +59            |
| Subtotal-----          | 135,505   | 67,257 | -50            |
| Divers:                |           |        |                |
| Scap-----              | 9,898     | 1,366  | -86            |
| Canvasback-----        | 568       | --     | --             |
| Redhead-----           | 7,335     | 3,031  | -59            |
| Ring-necked duck-----  | 950       | --     | --             |
| Bufflehead-----        | 284       | --     | --             |
| Ruddy duck-----        | 3,485     | 7,243  | +108           |
| Subtotal-----          | 22,520    | 11,640 | -48            |
| Total-----             | 158,025   | 78,897 | -50            |

<sup>1</sup> Species composition based on ground observations.

TABLE E-23.--Waterfowl breeding populations, by stratum, northern Saskatchewan, northern Manitoba, and western Ontario, May 1961 and 1962

[Index numbers, in thousands]

| Species                | Stratum   |          |     |                |       | Total |       | Percent change |  |
|------------------------|-----------|----------|-----|----------------|-------|-------|-------|----------------|--|
|                        | Ontario C | Manitoba |     | Saskatchewan C |       | 1961  | 1962  |                |  |
|                        |           | D        | C   | South          | North |       |       |                |  |
| <b>Ducks:</b>          |           |          |     |                |       |       |       |                |  |
| Dabblers:              |           |          |     |                |       |       |       |                |  |
| Pintail-----           | 0         | 8        | 3   | 2              | --    | 58    | 13    | -78            |  |
| Mallard-----           | 125       | 32       | 48  | 51             | 13    | 220   | 269   | +22            |  |
| American widgeon-----  | 7         | 9        | 7   | 10             | 5     | 22    | 38    | +73            |  |
| Shoveler-----          | 0         | 9        | --  | 2              | --    | 6     | 11    | +83            |  |
| Gadwall-----           | --        | 1        | 1   | 3              | --    | 15    | 5     | -67            |  |
| Blue-winged teal-----  | --        | 8        | --  | 15             | 4     | 3     | 27    | +800           |  |
| Green-winged teal----- | 4         | 3        | 3   | 2              | 1     | 6     | 13    | +117           |  |
| Black duck-----        | 48        | --       | 2   | 1              | 4     | 31    | 55    | +77            |  |
| Subtotal-----          | 184       | 70       | 64  | 86             | 27    | 361   | 431   | +19            |  |
| Divers:                |           |          |     |                |       |       |       |                |  |
| Scaup-----             | 46        | 22       | 36  | 59             | 72    | 212   | 235   | +11            |  |
| Canvasback-----        | 0         | 7        | 3   | 2              | --    | 50    | 12    | -76            |  |
| Redhead-----           | --        | 5        | --  | 6              | --    | 22    | 11    | -50            |  |
| Ring-necked duck-----  | 46        | 5        | 14  | 14             | 13    | 19    | 92    | +384           |  |
| Goldeneye-----         | 67        | 5        | 11  | 14             | 18    | 73    | 115   | +57            |  |
| Bufflehead-----        | 10        | 2        | 4   | 9              | 15    | 21    | 40    | +90            |  |
| Ruddy duck-----        | 3         | 1        | --  | 7              | --    | 7     | 11    | +57            |  |
| Subtotal-----          | 172       | 47       | 68  | 111            | 118   | 400   | 516   | +29            |  |
| Miscellaneous:         |           |          |     |                |       |       |       |                |  |
| Scoter-----            | 0         | --       | 9   | 3              | 11    | 36    | 23    | -36            |  |
| Merganser-----         | 108       | 4        | 43  | 13             | 24    | 127   | 192   | +51            |  |
| Subtotal-----          | 108       | 4        | 52  | 16             | 35    | 161   | 215   | +34            |  |
| Total ducks-----       | 464       | 121      | 184 | 213            | 180   | 922   | 1,162 | +26            |  |
| Canada geese-----      | 4         | 2        | 2   | 1              | 1     | 12    | 10    | -17            |  |
| Coots-----             | 0         | 5        | --  | 1              | --    | 30    | 6     | -80            |  |

TABLE E-24.--Waterfowl breeding populations, by species, northern Saskatchewan, northern Manitoba, and western Ontario, May 1955-62

[Index numbers, in thousands]

| Species                | 1955  | 1956 | 1957 | 1958 | 1959  | 1960  | 1961 | 1962  |
|------------------------|-------|------|------|------|-------|-------|------|-------|
| <b>Ducks:</b>          |       |      |      |      |       |       |      |       |
| Dabblers:              |       |      |      |      |       |       |      |       |
| Pintail-----           | 47    | 17   | 12   | 6    | 17    | 34    | 58   | 13    |
| Mallard-----           | 249   | 246  | 260  | 264  | 245   | 260   | 220  | 267   |
| American widgeon-----  | 33    | 8    | 7    | 8    | 17    | 24    | 22   | 37    |
| Shoveler-----          | 1     | --   | 1    | --   | 5     | 6     | 6    | 11    |
| Gadwall-----           | 1     | --   | 4    | --   | 10    | 1     | 15   | 4     |
| Blue-winged teal-----  | 4     | 3    | 1    | 18   | 12    | 9     | 3    | 27    |
| Green-winged teal----- | 13    | 6    | 6    | --   | 16    | 6     | 6    | 14    |
| Black duck-----        | 75    | 1    | --   | 6    | 16    | 10    | 31   | 56    |
| Subtotal-----          | 423   | 281  | 291  | 302  | 338   | 350   | 361  | 429   |
| Divers:                |       |      |      |      |       |       |      |       |
| Scap-----              | 441   | 187  | 446  | 269  | 329   | 209   | 212  | 235   |
| Canvasback-----        | 22    | 6    | 2    | 22   | 27    | 107   | 50   | 11    |
| Redhead-----           | 10    | 4    | 6    | --   | --    | 32    | 22   | 11    |
| Ring-necked duck-----  | 80    | 8    | 1    | --   | --    | 12    | 15   | 92    |
| Goldeneye-----         | 38    | 5    | 9    | 69   | 187   | 84    | 73   | 115   |
| Bufflehead-----        | 39    | 12   | 5    | 20   | 23    | 82    | 21   | 40    |
| Ruddy duck-----        | --    | --   | --   | --   | --    | Trace | 7    | 11    |
| Subtotal-----          | 630   | 222  | 469  | 380  | 566   | 526   | 400  | 515   |
| Miscellaneous:         |       |      |      |      |       |       |      |       |
| Scooter-----           | 49    | 7    | 53   | 36   | 64    | 15    | 34   | 23    |
| Merganser-----         | 310   | 62   | 133  | 218  | 106   | 252   | 127  | 191   |
| Subtotal-----          | 359   | 69   | 186  | 254  | 170   | 267   | 161  | 214   |
| Total ducks-----       | 1,412 | 572  | 946  | 936  | 1,074 | 1,143 | 922  | 1,158 |
| Canada geese-----      | 24    | 14   | 5    | --   | 35    | 8     | 12   | 11    |
| Coots-----             | --    | --   | --   | --   | 13    | 11    | 30   | 6     |

TABLE E-25.--Waterfowl breeding populations, by species, southern Manitoba, May 1954-62

[Index numbers, in thousands]

| Species                | 1954 | 1955  | 1956 | 1957  | 1958  | 1959 | 1960  | 1961 | 1962  |
|------------------------|------|-------|------|-------|-------|------|-------|------|-------|
| <b>Ducks:</b>          |      |       |      |       |       |      |       |      |       |
| Dabblers:              |      |       |      |       |       |      |       |      |       |
| Pintail-----           | 62   | 130   | 150  | 99    | 76    | 52   | 97    | 43   | 41    |
| Mallard-----           | 252  | 356   | 491  | 500   | 512   | 304  | 322   | 211  | 129   |
| American widgeon-----  | 17   | 28    | 27   | 25    | 91    | 46   | 12    | 20   | 11    |
| Shoveler-----          | 19   | 25    | 28   | 38    | 28    | 48   | 54    | 39   | 17    |
| Gadwall-----           | 8    | 8     | 5    | 6     | 8     | 5    | 4     | 10   | 9     |
| Blue-winged teal-----  | 67   | 88    | 53   | 63    | 141   | 158  | 95    | 84   | 33    |
| Green-winged teal----- | 8    | 4     | 2    | 3     | 7     | 4    | 2     | 5    | Trace |
| Subtotal-----          | 433  | 639   | 756  | 734   | 863   | 617  | 586   | 412  | 240   |
| Divers:                |      |       |      |       |       |      |       |      |       |
| Scaup-----             | 93   | 128   | 79   | 60    | 274   | 178  | 146   | 115  | 29    |
| Canvasback-----        | 30   | 28    | 39   | 31    | 61    | 19   | 37    | 31   | 16    |
| Redhead-----           | 18   | 25    | 21   | 17    | 32    | 38   | 26    | 10   | 11    |
| Ring-necked duck-----  | 4    | 2     | 7    | 4     | 7     | 16   | 5     | 6    | Trace |
| Goldeneye-----         | 6    | 4     | 4    | 5     | 7     | 10   | 5     | 4    | 3     |
| Bufflehead-----        | 8    | 6     | 2    | Trace | 3     | 4    | 4     | 3    | Trace |
| Ruddy duck-----        | 4    | 12    | 7    | 7     | 8     | 14   | 16    | 18   | 3     |
| Subtotal-----          | 163  | 205   | 159  | 124   | 392   | 279  | 239   | 187  | 62    |
| Miscellaneous:         |      |       |      |       |       |      |       |      |       |
| Other-----             | 1    | Trace | 2    | 1     | 1     | 9    | Trace | 2    | --    |
| Total ducks-----       | 597  | 844   | 917  | 859   | 1,256 | 905  | 825   | 601  | 302   |
| Coots-----             | 13   | 28    | 40   | 21    | 81    | 166  | 96    | 80   | 34    |

TABLE E-26.--Waterfowl breeding populations by species and stratum, southern Manitoba, May 1961 and 1962

[Index numbers, in thousands]

| Species                | 1960      |           |       | 1961      |           |       | Percent change |
|------------------------|-----------|-----------|-------|-----------|-----------|-------|----------------|
|                        | Stratum A | Stratum B | Total | Stratum A | Stratum B | Total |                |
| <b>Ducks:</b>          |           |           |       |           |           |       |                |
| Dabblers:              |           |           |       |           |           |       |                |
| Pintail-----           | 23        | 20        | 43    | 21        | 20        | 41    | -5             |
| Mallard-----           | 92        | 119       | 211   | 64        | 65        | 129   | -39            |
| American widgeon-----  | 12        | 8         | 20    | 8         | 3         | 11    | -45            |
| Shoveler-----          | 19        | 20        | 39    | 10        | 7         | 17    | -55            |
| Gadwall-----           | 6         | 4         | 10    | 7         | 2         | 9     | -7             |
| Blue-winged teal-----  | 57        | 27        | 84    | 24        | 9         | 33    | -48            |
| Green-winged teal----- | 2         | 3         | 5     | --        | Trace     | Trace | -82            |
| Subtotal-----          | 211       | 201       | 412   | 134       | 106       | 240   | -42            |
| Divers:                |           |           |       |           |           |       |                |
| Scaup-----             | 70        | 45        | 115   | 13        | 16        | 29    | -34            |
| Canvasback-----        | 24        | 7         | 31    | 10        | 6         | 16    | -27            |
| Redhead-----           | 8         | 2         | 10    | 6         | 6         | 12    | +37            |
| Ring-necked duck-----  | 3         | 3         | 6     | --        | Trace     | Trace | --             |
| Goldeneye-----         | 1         | 3         | 4     | --        | 3         | 3     | -25            |
| Bufflehead-----        | 2         | 1         | 3     | --        | Trace     | Trace | --             |
| Ruddy duck-----        | 9         | 9         | 18    | 2         | 1         | 3     | -55            |
| Subtotal-----          | 117       | 70        | 187   | 31        | 32        | 63    | -66            |
| Miscellaneous:         |           |           |       |           |           |       |                |
| Others-----            | Trace     | 2         | 2     | --        | --        | --    | --             |
| Total ducks-----       | 328       | 273       | 601   |           |           |       |                |
| Coots-----             | 28        | 52        | 80    | 10        | 24        | 34    | -57            |

TABLE E-27.--Duck breeding population indexes, Michigan, 1951-62

| Year      | Lineal miles censused | Potential breeders per lineal mile |             |
|-----------|-----------------------|------------------------------------|-------------|
|           |                       | Wood duck                          | All species |
| 1951----- | 120.0                 | 0.32                               | 8.18        |
| 1952----- | 82.0                  | .21                                | 7.13        |
| 1953----- | 95.5                  | .85                                | 12.75       |
| 1954----- | 93.5                  | .58                                | 12.31       |
| 1955----- | 111.2                 | .70                                | 11.00       |
| 1956----- | 110.5                 | .28                                | 11.48       |
| 1957----- | 135.4                 | .46                                | 9.30        |
| 1958----- | 121.0                 | .33                                | 15.00       |
| 1959----- | 135.0                 | .65                                | 13.46       |
| 1960----- | 124.4                 | .66                                | 13.26       |
| 1961----- | 126.4                 | .83                                | 17.07       |
| 1962----- | 138.8                 | 1.77                               | 1 --        |

<sup>1</sup> Not tabulated.

TABLE E-28.--Duck breeding populations, by stratum, Maritime Provinces, 1961 and 1962

[Index numbers]

| Species                | Stratum     |                      | Total |      | Percent change |
|------------------------|-------------|----------------------|-------|------|----------------|
|                        | Nova Scotia | Prince Edward Island | 1961  | 1962 |                |
| <b>Ducks:</b>          |             |                      |       |      |                |
| Dabblers:              |             |                      |       |      |                |
| Pintail-----           | 2           | 23                   | 20    | 25   | +25            |
| Mallard-----           | --          | --                   | --    | --   | --             |
| American widgeon-----  | 8           | 28                   | 29    | 36   | +24            |
| Shoveler-----          | --          | --                   | --    | --   | --             |
| Blue-winged teal-----  | 47          | 102                  | 107   | 149  | +39            |
| Green-winged teal----- | 17          | 20                   | 24    | 37   | +54            |
| Black duck-----        | 76          | 140                  | 230   | 216  | -6             |
| Wood duck-----         | --          | --                   | --    | --   | --             |
| Subtotal-----          | 150         | 313                  | 470   | 463  | -1             |
| Divers:                |             |                      |       |      |                |
| Scaup-----             | --          | --                   | --    | --   | --             |
| Ring-necked duck-----  | 143         | 47                   | 153   | 190  | +24            |
| Goldeneye-----         | 15          | 5                    | 8     | 20   | +150           |
| Subtotal-----          | 158         | 52                   | 161   | 210  | +30            |
| Total ducks-----       | 308         | 365                  | 631   | 673  | +7             |

## F. PRODUCTION SURVEY TABLES

TABLE F-1.--Number and size of duck broods, Tetlin and Fort Yukon study areas, Alaska, 1961 and 1962

| Species                | Fort Yukon       |              |                  |              |
|------------------------|------------------|--------------|------------------|--------------|
|                        | 1961             |              | 1962             |              |
|                        | Number of broods | Average size | Number of broods | Average size |
| Dabblers:              |                  |              |                  |              |
| Pintail-----           | 35               | 5.5          | 20               | 5.0          |
| Mallard-----           | 20               | 6.7          | 8                | 5.8          |
| American widgeon-----  | 84               | 7.1          | 63               | 6.1          |
| Shoveler-----          | 13               | 6.8          | 12               | 7.1          |
| Blue-winged teal-----  | --               | --           | --               | --           |
| Green-winged teal----- | 31               | 6.6          | 26               | 5.7          |
| Subtotal-----          | 183              | 6.6          | 129              | 5.9          |
| Divers:                |                  |              |                  |              |
| Scaup-----             | 18               | 7.7          | 10               | 8.2          |
| Canvasback-----        | 15               | 6.5          | 21               | 5.4          |
| Redhead-----           | --               | --           | --               | --           |
| Ring-necked duck-----  | --               | --           | --               | --           |
| Goldeneye-----         | 3                | 8.3          | 1                | .2           |
| Bufflehead-----        | 7                | 7.0          | 6                | 6.8          |
| Subtotal-----          | 43               | 7.2          | 38               | 6.5          |
| Miscellaneous: Scoter  | 2                | 7.0          | 3                | 7.0          |
| Total ducks-----       | 228              | 6.6          | 170              | 6.1          |

TABLE F-2.--Waterfowl species composition and nest density, Kashunuk river study area, Alaska, 1951 and 1962

| Species               | Number of nests found in-- |      |      |
|-----------------------|----------------------------|------|------|
|                       | 1951                       | 1961 | 1962 |
| Ducks:                |                            |      |      |
| Pintail-----          | 2                          | 5    | 3    |
| Oldsquaw-----         | 0                          | 1    | 2    |
| Spectacled eider----- | 8                          | 34   | 26   |
| Steller's eider-----  | 3                          | 1    | 5    |
| Subtotal-----         | 13                         | 41   | 36   |
| Geese:                |                            |      |      |
| Cackling goose-----   | 49                         | 44   | 67   |
| Black brant-----      | 74                         | 261  | 329  |
| Subtotal-----         | 123                        | 305  | 396  |
| Total-----            | 136                        | 346  | 432  |

TABLE F-3.--Black brant nest and brood data, by years,  
Kashunuk study area, Alaska

|  | 1951 | 1954 | 1961 | 1962 |
|--|------|------|------|------|
| Nests:                                 |      |      |      |      |
| Number located-----                    | 74   | --   | 135  | 100  |
| Average clutch size <sup>1</sup> ----- | 3.5  | --   | 3.6  | 3.6  |
| Hatching success-----                  | 81%  | --   | 85%  | 84%  |
| Broods:                                |      |      |      |      |
| Number counted-----                    | 288  | 159  | 454  | 459  |
| Average brood size:                    |      |      |      |      |
| First week <sup>2</sup> -----          | 3.8  | --   | 3.4  | 3.5  |
| Second week <sup>2</sup> -----         | 3.5  | --   | 2.8  | 3.3  |
| Third week <sup>3</sup> -----          | 3.2  | 2.2  | 2.8  | --   |

<sup>1</sup> Based on clutches that had been incubated 10 to 15 days.

<sup>2</sup> Age-class I.

<sup>3</sup> Age-class II.

TABLE F-4.--Results of aerial brood counts conducted in Northwest Territories and Yukon, 1962

| Strata and size                 | Date of coverage      | Number of broods |          |           | Total broods | Single adults | Two adults (pairs) | Average size of broods |          |           | Groups of 3 to 10 <sup>1</sup> | Percent change from 1961 |
|---------------------------------|-----------------------|------------------|----------|-----------|--------------|---------------|--------------------|------------------------|----------|-----------|--------------------------------|--------------------------|
|                                 |                       | Class I          | Class II | Class III |              |               |                    | Class I                | Class II | Class III |                                |                          |
| Stratum 2<br>(31.5 sq. mi.)---  | July 22               | 1                | 12       | --        | 13           | 98            | 48                 | 9.0                    | 4.5      | --        | 68                             | -54                      |
| Stratum 3<br>(18 sq. mi.)-----  | July 25               | --               | 3        | 1         | 4            | 1             | 3                  | --                     | 5.3      | 3.0       | 5                              | +100                     |
| Stratum 4<br>(108 sq. mi.)----- | July 25-27            | 8                | 18       | --        | 26           | 22            | 10                 | 5.8                    | 5.0      | --        | 14                             | -30                      |
| Stratum 6<br>(13.5 sq. mi.)---  | July 23               | 4                | 15       | --        | 19           | 20            | 9                  | 6.0                    | 4.7      | --        | 9                              | -55                      |
| Stratum 7<br>(148.5 sq. mi.)--  | July 31 -<br>August 3 | 19               | 74       | 21        | 114          | 65            | 50                 | 5.6                    | 5.8      | 6.0       | 43                             | -23                      |
| Stratum 8<br>(27 sq. mi.)-----  | August 1              | 2                | 19       | 5         | 26           | 25            | 11                 | 4.5                    | 5.4      | 4.8       | 20                             | -63                      |
| Stratum 10<br>(36 sq. mi.)----- | August 1              | 3                | 55       | 10        | 68           | 27            | 11                 | 5.0                    | 5.6      | 5.1       | 45                             | -38                      |
| Total<br>(382.5 sq. mi.)        | July 22 -<br>August 3 | 37               | 196      | 37        | 270          | 258           | 142                | 5.6                    | 5.4      | 5.5       | 204                            | -29                      |

<sup>1</sup> Possibly class III broods.

TABLE F-5.--Water fowl fall population indexes, Washington, 1961 and 1962  
[Includes young]

| Area                    | 1961    | 1962    | Percent change |
|-------------------------|---------|---------|----------------|
| Ducks:                  |         |         |                |
| Eastern Washington----- | 465,000 | 420,000 | -10            |
| Western Washington----- | 53,000  | 51,000  | -4             |
| Total-----              | 518,000 | 471,000 | -9             |
| Canada geese:           |         |         |                |
| Eastern Washington----- | 11,800  | --      | --             |

TABLE F-6.--Number of broods, by species, observed on trend routes in southeastern Idaho, 1954-62

| Species                             | 1954 | 1955 | 1956 | 1958 | 1959 | 1960 | 1961 | 1962 |
|-------------------------------------|------|------|------|------|------|------|------|------|
| Camas Refuge: <sup>1</sup>          |      |      |      |      |      |      |      |      |
| Dabblers:                           |      |      |      |      |      |      |      |      |
| Pintail-----                        | 4    | 2    | 4    | 3    | 3    | 2    | 7    | 6    |
| Mallard-----                        | 22   | 6    | 19   | 14   | 14   | 9    | 21   | 16   |
| American widgeon-----               | --   | --   | 3    | 1    | 2    | 3    | 2    | 12   |
| Shoveler-----                       | --   | 2    | 1    | 2    | 2    | --   | 1    | 7    |
| Gadwall-----                        | 9    | 8    | 7    | 5    | 3    | 2    | --   | 7    |
| Blue-winged and cinnamon teal-----  | 2    | 3    | 1    | 3    | 7    | --   | 6    | 6    |
| Green-winged teal-----              | 1    | --   | --   | 1    | 1    | 4    | 7    | --   |
| Subtotal-----                       | 38   | 21   | 35   | 29   | 32   | 20   | 44   | 54   |
| Divers:                             |      |      |      |      |      |      |      |      |
| Lesser scaup-----                   | 8    | 5    | 6    | 7    | --   | 1    | 1    | 3    |
| Canvasback-----                     | 1    | --   | --   | 1    | 2    | 1    | --   | --   |
| Redhead-----                        | 4    | 3    | 14   | 10   | 9    | 2    | 1    | 12   |
| Ruddy duck-----                     | 3    | --   | 4    | 1    | --   | --   | 3    | 5    |
| Subtotal-----                       | 16   | 8    | 24   | 19   | 11   | 4    | 5    | 20   |
| Unidentified-----                   | 10   | 9    | 30   | 8    | 11   | 4    | 3    | 4    |
| Total-----                          | 64   | 38   | 89   | 56   | 54   | 28   | 52   | 78   |
| Blackfoot Reservoir: <sup>1 2</sup> |      |      |      |      |      |      |      |      |
| Dabblers:                           |      |      |      |      |      |      |      |      |
| Pintail-----                        | 4    | 2    | --   | 8    | 20   | 16   | --   | 4    |
| Mallard-----                        | 14   | 12   | 8    | 28   | 30   | 35   | --   | 10   |
| American widgeon-----               | 4    | 6    | 11   | 10   | 18   | 2    | --   | 24   |
| Shoveler-----                       | --   | --   | --   | --   | --   | --   | --   | 1    |
| Gadwall-----                        | 33   | 23   | 41   | 54   | 15   | 23   | --   | 58   |
| Blue-winged and cinnamon teal-----  | 5    | 7    | 3    | 2    | 4    | 10   | --   | --   |
| Green-winged teal-----              | 1    | 1    | --   | 1    | 7    | 1    | --   | 1    |
| Subtotal-----                       | 61   | 51   | 63   | 103  | 94   | 87   | --   | 98   |
| Divers:                             |      |      |      |      |      |      |      |      |
| Lesser scaup-----                   | 8    | 6    | 12   | 8    | 2    | 2    | --   | --   |
| Canvasback-----                     | --   | --   | --   | --   | --   | --   | --   | --   |
| Redhead-----                        | 5    | 3    | --   | 1    | 1    | 3    | --   | 1    |
| Ruddy duck-----                     | --   | --   | --   | --   | --   | --   | --   | --   |
| Subtotal-----                       | 13   | 9    | 12   | 9    | 4    | 5    | --   | 1    |
| Unidentified-----                   | 4    | 5    | 4    | 13   | 14   | 38   | --   | 2    |
| Total-----                          | 78   | 65   | 79   | 125  | 112  | 130  | --   | 101  |

<sup>1</sup> No routes were censused in 1957.<sup>2</sup> Water levels too low in 1961 to permit operation of trend route.

TABLE F-7.--Trend in number of young produced on Canada goose nesting units, Idaho, 1955-62

| Nesting unit                | 1955  | 1956  | 1957  | 1958  | 1959  | 1960  | 1961  | 1962  | Percent change from 1961 |
|-----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|--------------------------|
| Southwestern Idaho:         |       |       |       |       |       |       |       |       |                          |
| Glenns Ferry-----           | 4     | 36    | 41    | 44    | 29    | 15    | 15    | --    | --                       |
| Homedale-----               | 601   | 627   | 1,030 | 798   | 541   | 863   | 769   | 882   | +15                      |
| Payette River-----          | --    | --    | --    | --    | 325   | 522   | 383   | 583   | +52                      |
| Southeastern Idaho:         |       |       |       |       |       |       |       |       |                          |
| Blackfoot Reservoir-----    | 387   | 323   | 201   | 267   | 274   | 313   | 250   | 199   | -20                      |
| Island Park Reservoir-----  | 52    | 185   | 95    | 121   | 179   | 206   | 130   | 117   | -18                      |
| North Fork Snake River----- | 94    | 152   | 136   | 145   | 213   | 148   | 124   | 180   | +45                      |
| North Lake-----             | 130   | 173   | 118   | 121   | 115   | 136   | 132   | 22    | -83                      |
| Total-----                  | 1,268 | 1,496 | 1,621 | 1,496 | 1,676 | 2,203 | 1,803 | 1,983 | +10                      |

TABLE F-8.--Canada goose production trends, Oregon, 1959-62

| Transect                    | Number of broods |      |      |      | Number of young |       |       |       |
|-----------------------------|------------------|------|------|------|-----------------|-------|-------|-------|
|                             | 1959             | 1960 | 1961 | 1962 | 1959            | 1960  | 1961  | 1962  |
| Klamath River-----          | 124              | 168  | 185  | 149  | 533             | 756   | 834   | 744   |
| Klamath Marsh-----          | 48               | 52   | 42   | 31   | 206             | 236   | 189   | 176   |
| Sprague River-----          | 40               | 37   | 34   | 27   | 172             | 165   | 153   | 144   |
| Alkali Lake-----            | 13               | 5    | 13   | 16   | 58              | 23    | 58    | 85    |
| Spring Lake-----            | 11               | 11   | 10   | 9    | 47              | 50    | 46    | 49    |
| Nuss Lake-----              | 10               | 26   | 49   | 19   | 41              | 119   | 221   | 104   |
| Agency Lake-----            | 66               | 43   | 43   | 13   | 285             | 194   | 192   | 78    |
| Wocus Lake-----             | 72               | 29   | 35   | 30   | 310             | 133   | 156   | 164   |
| Summer Lake-----            | 75               | 55   | 63   | 46   | 283             | 265   | 261   | 205   |
| Silver Lake-----            | 47               | 57   | 68   | 0    | 241             | 236   | 284   | 0     |
| Abert Lake-----             | 26               | 18   | 14   | 22   | 119             | 87    | 57    | 98    |
| Total-----                  | 532              | 501  | 556  | 362  | 2,295           | 2,264 | 2,451 | 1,847 |
| Percent change, 1962 from-- |                  |      |      |      |                 |       |       |       |
| 1961-----                   | --               | --   | +11  | -35  | --              | --    | +8    | -25   |
| Average, 1959-61-----       | --               | --   | +16  | -27  | --              | --    | +14   | -20   |

TABLE F-9.--Duck production trend, by areas, Oregon, 1959-62

| Transect                    | Square miles | Number of broods |      |      |      | Number of young |       |       |       |
|-----------------------------|--------------|------------------|------|------|------|-----------------|-------|-------|-------|
|                             |              | 1959             | 1960 | 1961 | 1962 | 1959            | 1960  | 1961  | 1962  |
| Klamath River-----          | 10.0         | 333              | 115  | 72   | 87   | 1,841           | 746   | 378   | 545   |
| Klamath Marsh-----          | 11.0         | 262              | 124  | 223  | 221  | 1,603           | 821   | 1,894 | 1,636 |
| E. Upper Klamath Lake-----  | 7.5          | 315              | 111  | 80   | 83   | 1,887           | 725   | 534   | 624   |
| W. Upper Klamath Lake-----  | 8.5          | 264              | 102  | 56   | 5    | 1,477           | 760   | 408   | 31    |
| Summer Lake-----            | 1.0          | 73               | 71   | 115  | 99   | 545             | 591   | 806   | 704   |
| Abert Lake-----             | 3.4          | 24               | 21   | 23   | 27   | 162             | 173   | 144   | 179   |
| Silver Lake-----            | 1.0          | 15               | 8    | 0    | 0    | 83              | 67    | 0     | 0     |
| Paulina Marsh-----          | .8           | 14               | 6    | 0    | 0    | 98              | 48    | 0     | 0     |
| Umatilla County-----        | 4.0          | 7                | 8    | 10   | 22   | 31              | 44    | 64    | 133   |
| Jefferson County-----       | .5           | 7                | 10   | 10   | 7    | 56              | 75    | 75    | 38    |
| Malheur County-----         | 60.0         | 59               | 78   | 82   | 75   | 284             | 445   | 474   | 505   |
| Total-----                  | 107.7        | 1,373            | 654  | 671  | 626  | 8,067           | 4,495 | 4,777 | 4,395 |
| Percent change, 1962 from-- |              |                  |      |      |      |                 |       |       |       |
| 1961-----                   | --           | --               | --   | +3   | -7   | --              | --    | +6    | -8    |
| Average 1959-61-----        | --           | --               | --   | -28  | -35  | --              | --    | -17   | -2    |

TABLE F-10. --Duck production trend, by species, Oregon, 1959-62

[ Comparative trends on 107.7 sq. mi. ]

| Species                            | Number of broods |      |      |      | Number of young |       |       |       |
|------------------------------------|------------------|------|------|------|-----------------|-------|-------|-------|
|                                    | 1959             | 1960 | 1961 | 1962 | 1959            | 1960  | 1961  | 1962  |
| Dabblers:                          |                  |      |      |      |                 |       |       |       |
| Pintail-----                       | 21               | 19   | 14   | 31   | 137             | 136   | 85    | 221   |
| Mallard-----                       | 281              | 98   | 169  | 121  | 1,502           | 696   | 989   | 763   |
| Shoveler-----                      | 2                | 2    | 2    | 3    | 14              | 16    | 11    | 17    |
| Gadwall-----                       | 76               | 57   | 44   | 64   | 541             | 441   | 333   | 452   |
| Blue-winged and cinnamon teal----- | 171              | 47   | 65   | 171  | 1,144           | 345   | 431   | 1,239 |
| Green-winged teal-----             | 0                | 0    | 0    | --   | 0               | 0     | 0     | --    |
| Wood duck-----                     | 2                | 0    | 1    | 3    | 9               | 0     | 6     | 20    |
| Subtotal-----                      | 553              | 223  | 295  | 393  | 3,347           | 1,634 | 1,855 | 2,712 |
| Divers:                            |                  |      |      |      |                 |       |       |       |
| Scaup-----                         | 27               | 22   | 9    | 14   | 191             | 130   | 54    | 101   |
| Canvasback-----                    | 46               | 0    | 0    | 6    | 276             | 0     | 0     | 44    |
| Redhead-----                       | 621              | 189  | 120  | 79   | 3,453           | 1,335 | 873   | 587   |
| Ruddy duck-----                    | 117              | 100  | 227  | 138  | 727             | 645   | 1,903 | 927   |
| Subtotal-----                      | 811              | 311  | 356  | 237  | 4,647           | 2,110 | 2,830 | 1,659 |
| Unclassified-----                  | 2                | 120  | 20   | 9    | 19              | 751   | 92    | 72    |
| Total-----                         | 1,366            | 654  | 671  | 639  | 8,013           | 4,495 | 4,777 | 1,731 |

TABLE F-11. --Fall waterfowl population indexes, by species and area, California, 1962

| Species            | Sacramento Valley | Suisun Marsh | North San Joaquin Valley | South San Joaquin Valley | North-eastern California | Klamath Basin | Total   |
|--------------------|-------------------|--------------|--------------------------|--------------------------|--------------------------|---------------|---------|
| Ducks:             |                   |              |                          |                          |                          |               |         |
| Dabblers:          |                   |              |                          |                          |                          |               |         |
| Pintail-----       | 2,000             | --           | 380                      | 190                      | 8,690                    | 1,640         | 12,900  |
| Mallard-----       | 58,970            | 2,280        | 3,990                    | 4,470                    | 16,250                   | 9,870         | 95,830  |
| Shoveler-----      | 890               | --           | 220                      | 60                       | 680                      | 2,050         | 3,900   |
| Gadwall-----       | 600               | 1,400        | 1,010                    | 250                      | 4,500                    | 14,140        | 21,900  |
| Cinnamon teal----- | 3,580             | 260          | 1,070                    | 440                      | 4,160                    | 7,830         | 17,340  |
| Subtotal-----      | 66,040            | 3,940        | 6,670                    | 5,410                    | 34,280                   | 35,530        | 151,870 |
| Divers:            |                   |              |                          |                          |                          |               |         |
| Scaup-----         | --                | --           | --                       | --                       | 620                      | 1,550         | 2,170   |
| Redhead-----       | 710               | --           | 220                      | --                       | 3,100                    | 15,430        | 19,460  |
| Ruddy-----         | 1,430             | --           | 280                      | --                       | 1,210                    | 17,160        | 20,080  |
| Subtotal-----      | 2,140             | --           | 500                      | --                       | 4,930                    | 34,140        | 41,710  |
| Miscellaneous----- | 0                 | 220          | 0                        | 60                       | 760                      | 980           | 2,020   |
| Total ducks-----   | 68,180            | 4,160        | 7,170                    | 5,470                    | 39,970                   | 70,650        | 195,600 |
| Canada goose-----  | --                | --           | --                       | --                       | 11,890                   | 6,610         | 18,490  |
| Coots-----         | 48,100            | 280          | 8,180                    | 7,180                    | 7,380                    | 21,010        | 92,130  |

TABLE F-12.--Nesting pair and fall population estimates, by species, California 1959-62

| Species            | Nesting pairs |        |        |        | Fall population index <sup>1</sup> |         |         |         |
|--------------------|---------------|--------|--------|--------|------------------------------------|---------|---------|---------|
|                    | 1959          | 1960   | 1961   | 1962   | 1959                               | 1960    | 1961    | 1962    |
| Ducks:             |               |        |        |        |                                    |         |         |         |
| Dabblers:          |               |        |        |        |                                    |         |         |         |
| Pintail-----       | 3,380         | 1,760  | 2,160  | 2,275  | 15,560                             | 10,870  | 10,420  | 12,900  |
| Mallard-----       | 32,750        | 40,500 | 33,110 | 22,700 | 150,190                            | 179,310 | 140,420 | 95,830  |
| Shoveler-----      | 1,060         | 820    | 620    | 825    | 5,820                              | 7,140   | 4,120   | 3,900   |
| Gadwall-----       | 3,500         | 3,850  | 3,930  | 2,820  | 20,100                             | 24,760  | 19,120  | 21,900  |
| Cinnamon teal----- | 4,330         | 5,870  | 4,080  | 3,350  | 18,800                             | 22,740  | 15,590  | 17,340  |
| Subtotal-----      | 45,020        | 52,800 | 43,900 | 32,420 | 210,470                            | 244,820 | 189,670 | 151,870 |
| Divers:            |               |        |        |        |                                    |         |         |         |
| Scaup-----         | 740           | 770    | 720    | 590    | 4,040                              | 5,390   | 3,840   | 2,170   |
| Redhead-----       | 3,030         | 3,330  | 2,740  | 2,180  | 17,080                             | 21,280  | 15,050  | 19,460  |
| Ruddy duck-----    | 1,930         | 3,040  | 3,580  | 2,830  | 8,890                              | 13,350  | 11,460  | 20,080  |
| Subtotal-----      | 5,700         | 7,140  | 7,040  | 5,600  | 30,010                             | 40,020  | 30,350  | 41,710  |
| Miscellaneous----- | 725           | 600    | 700    | 350    | 2,980                              | 3,730   | 3,370   | 2,020   |
| Total ducks-----   | 51,445        | 60,540 | 51,640 | 38,370 | 243,460                            | 288,570 | 223,390 | 195,600 |
| Canada goose-----  | 4,540         | 1,620  | 1,890  | 1,780  | 23,130                             | 18,570  | 19,790  | 18,490  |
| Coots-----         | 29,820        | 13,880 | 31,320 | 18,980 | 146,870                            | 75,210  | 156,500 | 92,130  |

<sup>1</sup> Includes young and resident adults.

TABLE F-13.--Number of young produced on key waterfowl areas, Nevada, 1960-62

| Species               | West-central Nevada |      | Northeastern Nevada |      |      | Total |       |       |
|-----------------------|---------------------|------|---------------------|------|------|-------|-------|-------|
|                       | 1960                | 1961 | 1959                | 1960 | 1961 | 1960  | 1961  | 1962  |
| Ducks:                |                     |      |                     |      |      |       |       |       |
| Dabblers:             |                     |      |                     |      |      |       |       |       |
| Pintail-----          | 22                  | 26   | 25                  | 72   | 30   | 94    | 56    | 323   |
| Mallard-----          | 131                 | 174  | 179                 | 334  | 411  | 465   | 585   | 724   |
| American widgeon----- | --                  | 22   | 10                  | 16   | 5    | 16    | 27    | 8     |
| Shoveler-----         | --                  | --   | 4                   | 18   | 8    | 18    | 8     | 50    |
| Gadwall-----          | 384                 | 287  | 50                  | 72   | 103  | 456   | 390   | 429   |
| Cinnamon teal-----    | 352                 | 264  | 127                 | 192  | 142  | 544   | 406   | 517   |
| Subtotal-----         | 889                 | 773  | 395                 | 704  | 699  | 1,593 | 1,472 | 2,051 |
| Divers:               |                     |      |                     |      |      |       |       |       |
| Scaup-----            | --                  | --   | 37                  | 50   | 15   | 50    | 15    | 18    |
| Canvasback-----       | --                  | --   | --                  | 55   | 66   | 55    | 66    | 79    |
| Redhead-----          | 366                 | 87   | 5                   | 5    | 31   | 371   | 118   | 434   |
| Ruddy duck-----       | 48                  | 68   | 8                   | 7    | --   | 55    | 68    | 195   |
| Subtotal-----         | 414                 | 155  | 50                  | 117  | 112  | 531   | 267   | 726   |
| Total ducks-----      | 1,303               | 928  | 445                 | 821  | 811  | 2,124 | 1,739 | 2,777 |
| Canada goose-----     | 315                 | 261  | --                  | 231  | 280  | 546   | 541   | 848   |

TABLE F-14.--Canada goose production, Utah, 1958-62

| Area                                | Number of broods |                  |                  |                  |                  | Number of young |                  |                  |                  |                  |
|-------------------------------------|------------------|------------------|------------------|------------------|------------------|-----------------|------------------|------------------|------------------|------------------|
|                                     | 1958             | 1959             | 1960             | 1961             | 1962             | 1958            | 1959             | 1960             | 1961             | 1962             |
| Round Valley-----                   | 17               | ( <sup>2</sup> ) | ( <sup>2</sup> ) | ( <sup>2</sup> ) | ( <sup>2</sup> ) | 77              | ( <sup>2</sup> ) | ( <sup>2</sup> ) | ( <sup>2</sup> ) | ( <sup>2</sup> ) |
| Cutler Reservoir-----               | 29               | 20               | 27               | 37               | 18               | 141             | 95               | 122              | 180              | 82               |
| Public shooting grounds-----        | 18               | 11               | 20               | 20               | 26               | 84              | 57               | 99               | 84               | 140              |
| Bear River Refuge and vicinity----- | 216              | 261              | 341              | 440              | 425              | 1,080           | 1,203            | 1,568            | 2,112            | 2,100            |
| Ogden Bay Refuge-----               | 75               | 76               | 78               | 70               | 68               | 360             | 334              | 412              | 310              | 320              |
| Farmington Bay Refuge-----          | 37               | 39               | 40               | 47               | 55               | 191             | 225              | 192              | 250              | 277              |
| Scipio Reservoir-----               | 6                | 3                | 1                | 3                | 5                | 22              | 16               | 4                | 13               | 28               |
| Fool's Creek Reservoir-----         | 11               | 6                | 6                | Dry              | 0                | 66              | 32               | 31               | Dry              | 0                |
| Redmond Lake-----                   | 10               | 6                | 12               | 12               | 12               | 60              | 32               | 72               | 72               | 66               |
| Gunnison Reservoir-----             | 7                | 10               | 8                | 2                | 7                | 38              | 48               | 41               | 13               | 31               |
| Clear Lake Refuge-----              | 7                | 2                | 0                | 5                | 4                | 28              | 9                | 0                | 24               | 21               |
| Stewart Lake Refuge-----            | 3                | 0                | 2                | 1                | 0                | 16              | 0                | 11               | 6                | 0                |
| Monk Reservoir-----                 | 6                | 7                | 0                | 6                | 6                | 34              | 32               | 0                | 31               | 27               |
| Wales Reservoir-----                | 3                | 7                | 11               | 12               | 6                | 20              | 37               | 62               | 70               | 31               |
| Rich Co. (Bear River)-----          | 37               | 37               | 41               | 50               | 76               | 164             | 172              | 179              | 257              | 328              |
| Otter Creek-----                    | 9                | ( <sup>2</sup> ) | ( <sup>2</sup> ) | ( <sup>2</sup> ) | ( <sup>2</sup> ) | 46              | ( <sup>2</sup> ) | ( <sup>2</sup> ) | ( <sup>2</sup> ) | ( <sup>2</sup> ) |
| Kooshaerm Reservoir-----            | 1                | 4                | 7                | 6                | 9                | 5               | 18               | 35               | 35               | 40               |
| Bicknell Bottoms-----               | 4                | 4                | 10               | 11               | 13               | 18              | 21               | 51               | 63               | 68               |
| Total-----                          | 496              | 493              | 604              | 722              | 730              | 2,450           | 2,331            | 2,879            | 3,520            | 3,559            |

<sup>1</sup> Estimated. <sup>2</sup> No count.

TABLE F-15.--Waterfowl brood indexes and late-nesting indexes, by species and stratum, southern Saskatchewan, July 1960 and 1961

[ Index numbers, in thousands ]

| Species                                | Stratum |        |        |        |       | Total |       | Average<br>1952-59 | Percent change<br>from-- |           |
|--|---------|--------|--------|--------|-------|-------|-------|--------------------|--------------------------|-----------|
|  | A-east  | A-west | B-east | B-west | C     | 1961  | 1962  |                    | 1961                     | Average   |
| <b>Broods:</b>                         |         |        |        |        |       |       |       |                    |                          |           |
| Duck brood index-----                  | 5       | 10     | 12     | 4      | 2     | 70    | 33    | 292                | -53                      | -89       |
| Average brood size <sup>1</sup> -----  | --      | --     | --     | --     | --    | 4.4   | 5.2   | 5.3                | +18                      | No change |
| Coot brood index-----                  | 1       | --     | --     | --     | --    | 6     | 1     | 53                 | -83                      | -98       |
| Late-nesting index. <sup>2</sup> ----- |         |        |        |        |       |       |       |                    |                          |           |
| <b>Dabblers:</b>                       |         |        |        |        |       |       |       |                    |                          |           |
| Pintail-----                           | Trace   | 2      | 1      | 1      | 1     | 3     | 5     |                    |                          |           |
| Mallard-----                           | 2       | 6      | 3      | 1      | Trace | 40    | 12    |                    |                          |           |
| American widgeon-----                  | --      | 1      | Trace  | Trace  | --    | 2     | 1     |                    |                          |           |
| Shoveler-----                          | --      | Trace  | --     | --     | --    | 2     | --    |                    |                          |           |
| Gadwall-----                           | Trace   | 2      | --     | --     | Trace | 2     | 2     |                    |                          |           |
| Blue-winged teal-----                  | 1       | 1      | --     | --     | --    | 3     | 2     |                    |                          |           |
| Green-winged teal-----                 | --      | --     | --     | --     | --    | --    | --    |                    |                          |           |
| Subtotal-----                          | 3       | 12     | 4      | 2      | 1     | 52    | 22    |                    |                          |           |
| <b>Divers:</b>                         |         |        |        |        |       |       |       |                    |                          |           |
| Scaup-----                             | --      | Trace  | --     | --     | --    | 10    | Trace |                    |                          |           |
| Canvasback-----                        | --      | --     | --     | --     | --    | 2     | --    |                    |                          |           |
| Redhead-----                           | --      | Trace  | --     | --     | --    | --    | Trace |                    |                          |           |
| Ring-necked duck-----                  | Trace   | Trace  | --     | --     | 1     | 4     | 1     |                    |                          |           |
| Goldeneye-----                         | --      | --     | --     | --     | --    | --    | --    |                    |                          |           |
| Bufflehead-----                        | --      | --     | --     | --     | --    | 3     | --    |                    |                          |           |
| Ruddy duck-----                        | --      | --     | --     | --     | --    | 1     | --    |                    |                          |           |
| Subtotal-----                          | Trace   | Trace  | --     | --     | 1     | 20    | 1     |                    |                          |           |
| Miscellaneous ducks-----               | --      | --     | --     | --     | --    | --    |       |                    |                          |           |
| Total-----                             | 3       | 12     | 4      | 2      | 2     | 72    | 23    | 270                | -68                      | -91       |

<sup>1</sup> Class III broods only.<sup>2</sup> As indicated by adult pairs and singles.

TABLE F-16. --Waterfowl brood indexes and late-nesting indexes, by species and year, southern Saskatchewan,  
July, 1953-62

[Index numbers, in thousands]

| Species                               | 1953 | 1954 | 1955 | 1956  | 1957  | 1958 | 1959  | 1960 | 1961 | 1962  |
|---------------------------------------|------|------|------|-------|-------|------|-------|------|------|-------|
| Broods:                               |      |      |      |       |       |      |       |      |      |       |
| Duck brood index-----                 | 184  | 100  | 317  | 422   | 616   | 253  | 106   | 126  | 70   | 33    |
| Average brood size <sup>1</sup> ----- | 5.6  | 4.8  | 6.0  | 5.6   | 6.0   | 4.3  | 3.7   | 3.8  | 4.4  | 5.2   |
| Coot brood index-----                 | 8    | 4    | 21   | 82    | 254   | 22   | 5     | 15   | 6    | 1     |
| Late-nesting index: <sup>2</sup>      |      |      |      |       |       |      |       |      |      |       |
| Dabblers:                             |      |      |      |       |       |      |       |      |      |       |
| Pintail-----                          | 33   | 12   | 79   | 18    | 5     | 32   | 3     | 10   | 3    | 5     |
| Mallard-----                          | 108  | 83   | 180  | 80    | 42    | 183  | 80    | 150  | 40   | 12    |
| American widgeon-----                 | 21   | 17   | 21   | 12    | 4     | 23   | 15    | 21   | 2    | 1     |
| Shoveler-----                         | 13   | 5    | 23   | 12    | 2     | 11   | 3     | 15   | 2    | --    |
| Gadwall-----                          | 15   | 14   | 28   | 17    | 4     | 17   | 5     | 30   | 2    | 2     |
| Blue-winged teal-----                 | 35   | 24   | 78   | 54    | 12    | 50   | 36    | 40   | 3    | 2     |
| Green-winged teal-----                | 4    | 6    | 8    | 2     | 1     | 4    | 1     | 1    | --   | --    |
| Subtotal-----                         | 229  | 161  | 417  | 195   | 70    | 320  | 143   | 267  | 52   | 22    |
| Divers:                               |      |      |      |       |       |      |       |      |      |       |
| Scap-----                             | 28   | 11   | 44   | 26    | 28    | 35   | 11    | 18   | 10   | Trace |
| Canvasback-----                       | 16   | 3    | 16   | 7     | 2     | 8    | 4     | 1    | 2    | --    |
| Redhead-----                          | 8    | 4    | 8    | 11    | 2     | 8    | 1     | 5    | --   | Trace |
| Ring-necked duck-----                 | 3    | 4    | 4    | Trace | Trace | 3    | 2     | --   | 4    | 1     |
| Goldeneye-----                        | --   | 2    | --   | --    | --    | --   | 1     | 2    | --   | --    |
| Bufflehead-----                       | 1    | --   | 1    | --    | --    | --   | Trace | --   | 3    | --    |
| Ruddy duck-----                       | 14   | 18   | 20   | 21    | 8     | 21   | 18    | 19   | 1    | --    |
| Subtotal-----                         | 70   | 42   | 93   | 65    | 40    | 75   | 37    | 45   | 20   | 1     |
| Miscellaneous ducks-----              | 2    | 1    | 4    | 1     | --    | 1    | 2     | 3    | --   | --    |
| Total-----                            | 301  | 204  | 514  | 261   | 110   | 396  | 182   | 315  | 72   | 23    |

<sup>1</sup> Class III broods only.

<sup>2</sup> As indicated by adult pairs and singles.

TABLE F-17. --Canada goose production by areas, Montana, 1958-62

|                                   | Hi-Line | Helena    | Great Falls-Piedmont | Total |
|-----------------------------------|---------|-----------|----------------------|-------|
| Adults without young:             |         |           |                      |       |
| 1958-----                         | 91      | --        | --                   | --    |
| 1959-----                         | 14      | 96        | 56                   | --    |
| 1960-----                         | 74      | 48        | 35                   | 157   |
| 1961-----                         | 8       | 73        | 28                   | 109   |
| 1962-----                         | 53      | 73        | 41                   | --    |
| Adults with young:                |         |           |                      |       |
| 1958-----                         | 498     | --        | --                   | --    |
| 1959-----                         | 303     | 112       | 46                   | --    |
| 1960-----                         | 728     | 153       | 22                   | 903   |
| 1961-----                         | 367     | 74        | 28                   | 469   |
| 1962-----                         | 309     | 74        | 50                   | --    |
| Number of Young:                  |         |           |                      |       |
| 1958-----                         | 1,233   | --        | --                   | --    |
| 1959-----                         | 1,679   | 285       | 97                   | --    |
| 1960-----                         | 1,519   | 285       | 44                   | 1,848 |
| 1961-----                         | 861     | 317       | 67                   | 1,245 |
| 1962-----                         | 744     | 317       | 131                  | --    |
| Total:                            |         |           |                      |       |
| 1958-----                         | 1,822   | --        | --                   | --    |
| 1959-----                         | 1,466   | 493       | 199                  | --    |
| 1960-----                         | 2,321   | 486       | 101                  | 2,908 |
| 1961-----                         | 1,236   | 464       | 123                  | 1,823 |
| 1962-----                         | 1,106   | 464       | 222                  | 1,792 |
| Percent change, 1962 from 1961--- | -11     | No change | +80                  | -2    |

<sup>1</sup> The 1959 census was not complete. Total numbers indicated are those estimated by the banding crew prior to banding.

TABLE F-18. --Waterfowl production indexes by strata, North Dakota, South Dakota, and western Minnesota, 1961 and 1962

|                     | Stratum   |         |        | Total   |
|---------------------|-----------|---------|--------|---------|
|                     | East      | Central | West   |         |
| Brood index:        |           |         |        |         |
| Ducks:              |           |         |        |         |
| 1961-----           | 12,800    | 34,500  | 17,500 | 64,800  |
| 1962-----           | 15,200    | 47,600  | 16,600 | 79,400  |
| Percent change----- | +19       | +38     | -5     | +22     |
| Coots:              |           |         |        |         |
| 1961-----           | 600       | 2,000   | 500    | 3,100   |
| 1962-----           | 600       | 3,600   | 0      | 4,200   |
| Percent change----- | No change | +80     | --     | +35     |
| Late-nesting index: |           |         |        |         |
| 1961-----           | 21,900    | 46,100  | 5,800  | 73,800  |
| 1962-----           | 37,000    | 99,300  | 8,800  | 145,100 |
| Percent change----- | +70       | +115    | +79    | +97     |

TABLE F-19.--Waterfowl production indexes, North Dakota, South Dakota, and Western Minnesota, 1959-62

|                         | 1959   | 1960   | 1961   | 1962    |
|-------------------------|--------|--------|--------|---------|
| Brood index:            |        |        |        |         |
| Duck-----               | 25,100 | 85,600 | 64,800 | 79,400  |
| Coot-----               | 2,000  | 4,900  | 3,100  | 4,200   |
| Late-nesting index----- | 16,200 | 48,200 | 73,800 | 145,100 |

TABLE F-20.--Percentage species composition of duck broods seen during mid-July surveys, North Dakota, 1961 and 1962

| Species               | 1955-61 average | 1961  | 1962  |
|-----------------------|-----------------|-------|-------|
| Dabblers:             |                 |       |       |
| Pintail-----          | 15.7            | 29.8  | 13.1  |
| Mallard-----          | 17.5            | 16.8  | 19.7  |
| American widgeon----- | 1.2             | 2.4   | 3.3   |
| Shoveler-----         | 5.2             | 11.5  | 14.7  |
| Gadwall-----          | 13.7            | 9.6   | 19.7  |
| Blue-winged teal----- | 38.0            | 28.9  | 24.6  |
| Subtotal-----         | 91.3            | 99.0  | 95.1  |
| Divers:               |                 |       |       |
| Scaup-----            | 0.2             | --    | --    |
| Canvasback-----       | 4.7             | .5    | 4.9   |
| Redhead-----          | 2.4             | --    | --    |
| Ruddy duck-----       | 1.4             | .5    | --    |
| Subtotal-----         | 8.7             | 1.0   | 4.9   |
| Total-----            | 100.0           | 100.0 | 100.0 |

TABLE F-21.--Age class composition of duck broods seen during mid-July surveys, North Dakota, 1961 and 1962

| Age class | Percent of total |      |      |
|-----------|------------------|------|------|
|           | 1955-61 average  | 1961 | 1962 |
| I-----    | 62.5             | 51.9 | 60.7 |
| II-----   | 32.3             | 41.4 | 32.8 |
| III-----  | 5.2              | 6.7  | 6.5  |

TABLE F-22.--Duck production survey data, South Dakota, 1953-62

| Year                        | Broods |                    |
|-----------------------------|--------|--------------------|
|                             | Index  | Number per sq. mi. |
| 1962:                       |        |                    |
| Stratum 1-----              | 5,700  | .26                |
| Stratum 2-----              | 26,700 | 1.05               |
| Stratum 3-----              | 11,800 | .44                |
| Total-----                  | 44,200 | .60                |
| 1961-----                   | 33,000 | .45                |
| Average, 1953-61-----       | 33,000 | .45                |
| Percent change, 1962 from-- |        |                    |
| 1961-----                   | +35    | --                 |
| Average-----                | +35    | --                 |

TABLE F-23.--Aerial duck production data, Nebraska Sandhills, 1962

|                              | Stratum |       | Total  |
|------------------------------|---------|-------|--------|
|                              | A       | B     |        |
| Square miles sampled-----    | 108     | 36    | 144    |
| Square miles in stratum----- | 10,869  | 5,363 | 16,232 |
| Number of broods seen-----   | 14      | 0     | 14     |
| Brood index-----             | 1,400   | 00    | 1,400  |
| Percent by age classes:      |         |       |        |
| Class I-----                 | --      | --    | 57     |
| Class II-----                | --      | --    | 36     |
| Class III-----               | --      | --    | 7      |

TABLE F-24.--Number of Canada goose goslings observed, Moffat County, Colorado, 1962

| Area                    | Number of goslings |      |         | Percent change |              |
|-------------------------|--------------------|------|---------|----------------|--------------|
|                         | 1962               | 1961 | 1956-61 | From 1961      | From 1956-61 |
| Yampa River-----        | 126                | 74   | 53      | +70            | +138         |
| Green River-----        | 21                 | 8    | 26      | +162           | -19          |
| Little Snake River----- | 1 --               | --   | --      | --             | --           |
| Total-----              | 147                | 82   | 79      | +79            | +86          |

<sup>1</sup> It is doubtful if any nests were hatched in the 25-mile stretch of the Little Snake River covered in this survey, because of high water.

TABLE F-25.--Production survey indexes, by stratum, northern Saskatchewan, northern Manitoba, and western Ontario, July 1955-62

[ Index numbers, in thousands ]

| Year                             | Stratum   |          |    |                |       | Total |  |
|----------------------------------|-----------|----------|----|----------------|-------|-------|--|
|                                  | Ontario C | Manitoba |    | Saskatchewan C |       |       |  |
|                                  |           | C        | D  | South          | North |       |  |
| Number of young: <sup>1</sup>    |           |          |    |                |       |       |  |
| 1955-----                        | --        | 59       | 30 | 46             | 80    | 215   |  |
| 1956-----                        | --        | 2        | 7  | 11             | 86    | 106   |  |
| 1959-----                        | --        | 25       | 20 | 62             | 58    | 165   |  |
| 1960-----                        | 60        | 45       | 26 | 26             | 56    | 213   |  |
| 1961-----                        | 116       | 47       | 37 | 38             | 65    | 303   |  |
| 1962-----                        | 173       | 52       | 24 | 68             | 77    | 394   |  |
| Late-nesting index: <sup>2</sup> |           |          |    |                |       |       |  |
| 1955-----                        | --        | 29       | 10 | 11             | 13    | 63    |  |
| 1956-----                        | --        | 2        | 7  | 5              | 28    | 42    |  |
| 1959-----                        | --        | 9        | 4  | 9              | 17    | 39    |  |
| 1960-----                        | 22        | 9        | 6  | 8              | 17    | 62    |  |
| 1961-----                        | 6         | 8        | 16 | 9              | 12    | 51    |  |
| 1962-----                        | 100       | 30       | 58 | 82             | 29    | 299   |  |

<sup>1</sup> Number of broods multiplied by average brood size.

<sup>2</sup> As indicated by adult pairs and singles.

TABLE F-26.--Duck broods, by class and stratum, northern Saskatchewan, northern Manitoba, and western Ontario 1956-1962

| Year and class | Stratum   |          |    |                |       | Total broods | Percent of total |  |  |
|----------------|-----------|----------|----|----------------|-------|--------------|------------------|--|--|
|                | Ontario C | Manitoba |    | Saskatchewan C |       |              |                  |  |  |
|                |           | C        | D  | South          | North |              |                  |  |  |
| 1956:          |           |          |    |                |       |              |                  |  |  |
| Class I-----   | --        | 10       | 16 | 4              | 19    | 49           | 69               |  |  |
| Class II-----  | --        | 1        | 4  | 10             | 5     | 20           | 28               |  |  |
| Class III----- | --        | 0        | 0  | 2              | 0     | 2            | 3                |  |  |
| 1959:          |           |          |    |                |       |              |                  |  |  |
| Class I-----   | --        | 2        | 14 | 3              | 0     | 19           | 11               |  |  |
| Class II-----  | --        | 6        | 23 | 27             | 5     | 61           | 34               |  |  |
| Class III----- | --        | 11       | 26 | 57             | 4     | 98           | 55               |  |  |
| 1960:          |           |          |    |                |       |              |                  |  |  |
| Class I-----   | 4         | 3        | 13 | 2              | 1     | 23           | 10               |  |  |
| Class II-----  | 13        | 12       | 41 | 8              | 11    | 85           | 35               |  |  |
| Class III----- | 24        | 36       | 43 | 25             | 5     | 133          | 55               |  |  |
| 1961:          |           |          |    |                |       |              |                  |  |  |
| Class I-----   | 21        | 5        | 35 | 10             | 3     | 74           | 19               |  |  |
| Class II-----  | 30        | 22       | 73 | 24             | 11    | 160          | 41               |  |  |
| Class III----- | 35        | 28       | 51 | 33             | 7     | 154          | 40               |  |  |
| 1962:          |           |          |    |                |       |              |                  |  |  |
| Class I-----   | 10        | 5        | 6  | 8              | 1     | 30           | 17               |  |  |
| Class II-----  | 28        | 22       | 24 | 28             | 6     | 108          | 62               |  |  |
| Class III----- | 8         | 11       | 11 | 4              | 3     | 37           | 21               |  |  |

TABLE F-27.--Waterfowl brood indexes and late-nesting indexes, by species and stratum, southern Manitoba, July 1961 and 1962

[Index numbers, in thousands]

| Species                               | 1962      |           |       | 1961  | Average, 1954-60 | Percent change from-- |           |
|---------------------------------------|-----------|-----------|-------|-------|------------------|-----------------------|-----------|
|                                       | Stratum A | Stratum B | Total |       |                  | 1961                  | Average   |
| Broods:                               |           |           |       |       |                  |                       |           |
| Duck brood index-----                 | 5         | 10        | 15    | 36    | 37               | -58                   | -59       |
| Average brood size <sup>1</sup> ----- | --        | --        | 5.3   | 5.5   | 5.7              | 3.6                   | -7        |
| Coot brood index-----                 | 1         | 4         | 5     | 4     | 8                | +25                   | -37       |
| Late-nesting indexes:                 |           |           |       |       |                  |                       |           |
| Dabblers:                             |           |           |       |       |                  |                       |           |
| Pintail-----                          | Trace     | --        | --    | 2     | 3                | --                    | --        |
| Mallard-----                          | 5         | 2         | 7     | 8     | 20               | -13                   | -65       |
| American widgeon-----                 | --        | --        | --    | 3     | 4                | --                    | --        |
| Shoveler-----                         | --        | --        | --    | Trace | 1                | --                    | --        |
| Gadwall-----                          | 1         | 1         | 2     | 1     | 1                | +100                  | +100      |
| Blue-winged teal-----                 | 2         | 1         | 3     | 2     | 10               | +50                   | -70       |
| Green-winged teal-----                | --        | --        | --    | Trace | 1                | --                    | --        |
| Subtotal-----                         | 8         | 4         | 12    | 16    | 40               | -25                   | -70       |
| Divers:                               |           |           |       |       |                  |                       |           |
| Scaup-----                            | Trace     | 1         | 1     | 3     | 4                | -66                   | -75       |
| Canvasback-----                       | --        | --        | --    | 1     | 1                | --                    | --        |
| Redhead-----                          | Trace     | --        | Trace | 1     | 2                | --                    | --        |
| Ring-necked duck-----                 | Trace     | 1         | 1     | 1     | 1                | No change             | No change |
| Goldeneye-----                        | Trace     | --        | Trace | Trace | Trace            | --                    | --        |
| Bufflehead-----                       | --        | --        | --    | 1     | 1                | --                    | --        |
| Ruddy duck-----                       | 1         | 1         | 2     | 1     | 5                | +100                  | -60       |
| Subtotal-----                         | 1         | 3         | 4     | 8     | 14               | -50                   | -71       |
| Miscellaneous:                        |           |           |       |       |                  |                       |           |
| Others-----                           | --        | --        | --    | --    | Trace            | --                    | --        |
| Total ducks-----                      | 9         | 7         | 16    | 24    | 54               | -50                   | -70       |

<sup>1</sup> Classes II and III.

TABLE F-28.--Waterfowl brood and late-nesting indexes, by species, southern Manitoba, July 1955-62

| Species                 | 1955 | 1956  | 1957  | 1958  | 1959  | 1960  | 1961  | 1962  |
|-------------------------|------|-------|-------|-------|-------|-------|-------|-------|
| Broods:                 |      |       |       |       |       |       |       |       |
| Duck brood index-----   | 23   | 25    | 60    | 63    | 31    | 32    | 36    | 16    |
| Average brood size----- | 5.6  | 5.1   | 5.6   | 6.6   | 5.4   | 6.2   | 5.5   | 5.3   |
| Coot brood index-----   | 3    | 2     | 16    | 13    | 1     | 19    | 5     | 5     |
| Late-nesting index:     |      |       |       |       |       |       |       |       |
| Dabblers:               |      |       |       |       |       |       |       |       |
| Pintail-----            | 2    | 3     | 3     | 5     | 2     | 3     | 2     | Trace |
| Mallard-----            | 22   | 19    | 14    | 24    | 20    | 18    | 8     | 6     |
| American widgeon-----   | 2    | 2     | Trace | 9     | 4     | 3     | 3     | --    |
| Shoveler-----           | 1    | 2     | Trace | 1     | Trace | 3     | Trace | --    |
| Gadwall-----            | 1    | 1     | 1     | 1     | 1     | 1     | 1     | 2     |
| Blue-winged teal-----   | 6    | 7     | 3     | 16    | 21    | 11    | 2     | 3     |
| Green-winged teal-----  | --   | 2     | Trace | 1     | Trace | 1     | Trace | --    |
| Subtotal-----           | 34   | 36    | 18    | 57    | 48    | 40    | 16    | 11    |
| Divers:                 |      |       |       |       |       |       |       |       |
| Scaup-----              | 1    | 2     | 1     | 11    | 8     | 2     | 3     | 1     |
| Canvasback-----         | 2    | 1     | --    | 4     | 1     | Trace | 1     | --    |
| Redhead-----            | 2    | 3     | Trace | 3     | 1     | 1     | 1     | Trace |
| Ringnecked duck-----    | 2    | Trace | Trace | 2     | 1     | Trace | 1     | 1     |
| Goldeneye-----          | --   | --    | 1     | Trace | 1     | --    | Trace | --    |
| Ruflehead-----          | --   | --    | --    | 1     | 2     | 1     | Trace | --    |
| Ruddy duck-----         | 8    | 6     | 3     | 6     | 7     | 4     | 1     | 2     |
| Subtotal -----          | 15   | 12    | 5     | 27    | 21    | 8     | 7     | 4     |
| Miscellaneous:          |      |       |       |       |       |       |       |       |
| Other-----              |      |       |       |       |       |       |       |       |
| Total ducks-----        | 49   | 48    | 21    | 85    | 69    | 48    | 24    | 15    |

TABLE F-29. --Percentage age-class distribution of duck broods, by stratum, southern Manitoba, 1954-62

| Year      | Stratum A |          |           | Stratum B |          |           | Total   |          |           |
|-----------|-----------|----------|-----------|-----------|----------|-----------|---------|----------|-----------|
|           | Class I   | Class II | Class III | Class I   | Class II | Class III | Class I | Class II | Class III |
| 1954----- | 61.5      | 33.5     | 5.0       | 62.9      | 20.0     | 17.1      | 62.2    | 26.4     | 11.4      |
| 1955----- | 41.9      | 30.2     | 27.9      | 17.4      | 43.5     | 39.1      | 29.9    | 36.7     | 33.4      |
| 1956----- | 31.2      | 41.6     | 27.2      | 17.6      | 50.0     | 32.4      | 29.4    | 42.8     | 27.8      |
| 1957----- | 29.2      | 43.2     | 27.6      | 28.1      | 56.1     | 15.8      | 29.1    | 44.4     | 26.5      |
| 1958----- | 51.7      | 34.5     | 13.8      | 45.2      | 45.2     | 9.7       | 51.2    | 35.4     | 13.5      |
| 1959----- | 60.4      | 32.7     | 6.8       | 63.0      | 34.8     | 2.2       | 60.8    | 33.0     | 6.2       |
| 1960----- | 47.4      | 45.4     | 7.2       | 41.0      | 54.1     | 4.9       | 45.9    | 47.5     | 6.7       |
| 1961----- | 35.6      | 50.0     | 14.4      | 28.8      | 59.1     | 12.1      | 30.9    | 56.3     | 12.8      |
| 1962----- | 40.2      | 50.5     | 9.2       | 42.3      | 42.3     | 15.4      | 40.6    | 48.7     | 10.7      |

TABLE F-30.--Duck production indexes, Michigan, 1951-62

| Year | Number per lineal mile |                |             | Average brood size |
|------|------------------------|----------------|-------------|--------------------|
|      | Broods                 | Hens and young | Lone drakes |                    |
| 1951 | 0.35                   | 2.20           | 3.31        | 5.76               |
| 1952 | .70                    | 3.92           | 3.21        | 4.60               |
| 1953 | .51                    | 3.63           | 4.32        | 6.10               |
| 1954 | .20                    | 1.67           | 4.60        | 6.24               |
| 1955 | .64                    | 4.65           | 5.09        | 6.28               |
| 1956 | .53                    | 3.67           | 4.40        | 5.86               |
| 1957 | .38                    | 2.30           | 4.80        | 5.10               |
| 1958 | .31                    | 2.18           | 6.50        | 5.97               |
| 1959 | .66                    | 4.00           | 12.58       | 5.06               |
| 1960 | .33                    | 2.48           | 14.49       | 6.50               |
| 1961 | .67                    | 3.80           | 7.71        | 5.64               |
| 1962 | .87                    | 5.64           | 8.48        | 5.60               |

TABLE F-31.--Wood duck broods observed by stream area and age class, Indiana, 1962

| Stream area                              | Miles of transect | Date censused | Number of broods |    |    |              |    |    | Total | Percent change from 1961 | 5-year average 1957-61 | 10-year average 1952-61 |       |  |  |  |
|--|-------------------|---------------|------------------|----|----|--------------|----|----|-------|--------------------------|------------------------|-------------------------|-------|--|--|--|
|  |                   |               | Age class I      |    |    | Age class II |    |    |       |                          |                        |                         |       |  |  |  |
|  |                   |               | A                | B  | C  | A            | B  | C  |       |                          |                        |                         |       |  |  |  |
| Maumee-----                              | 15                | June 13       | --               | 4  | -- | --           | 3  | 2  | 9     | 6                        | +50.0                  | 7.2                     | 6.6   |  |  |  |
| Elkhart-----                             | 17                | June 12       | --               | -- | 3  | 2            | -- | -- | 5     | 5                        | --                     | 3.8                     | 3.4   |  |  |  |
| Iroquois-----                            | 14                | June 8        | --               | -- | 2  | --           | -- | 1  | 3     | --                       | --                     | 1.8                     | 2.9   |  |  |  |
| Mississinewa-----                        | 13                | June 7        | --               | -- | -- | 2            | 2  | 1  | 5     | --                       | --                     | 2.8                     | 4.9   |  |  |  |
| Big Blue-----                            | 12                | June 6        | --               | 3  | 2  | 3            | 3  | 1  | 12    | 5                        | +140.0                 | 4.6                     | 6.8   |  |  |  |
| White, West Fork                         | 25                | June 5        | --               | 3  | 3  | 1            | 1  | 1  | 9     | 5                        | +80.0                  | 10.2                    | 13.8  |  |  |  |
| Muscatatuck-----                         | 19                | May 22        | 4                | 21 | 11 | 6            | 5  | 2  | 49    | 64                       | -23.4                  | 46.2                    | 34.6  |  |  |  |
| Salt Creek-----                          | 15                | May 23        | 3                | 7  | 5  | 3            | 2  | 1  | 21    | 17                       | +23.5                  | 13.0                    | 9.1   |  |  |  |
| Eel River-----                           | 13                | May 24        | 1                | 7  | 2  | 1            | 3  | 2  | 16    | 8                        | +100.0                 | 12.6                    | 9.5   |  |  |  |
| Total-----                               | 143               |               | 8                | 45 | 28 | 18           | 19 | 11 | 129   | 110                      |                        |                         |       |  |  |  |
| Percent change from 1961-----            |                   |               |                  |    |    |              |    |    |       |                          | +17.3                  | --                      | --    |  |  |  |
| Percent change from 5-year average-----  |                   |               |                  |    |    |              |    |    |       |                          | --                     | +26.2                   | --    |  |  |  |
| Percent change from 10-year average----- |                   |               |                  |    |    |              |    |    |       |                          | --                     | --                      | +40.8 |  |  |  |

TABLE F-32.--Duck nesting effort and production data, Missouri, 1953-61

|                                      | 1953  | 1954  | 1955  | 1956  | 1957  | 1958  | 1959  | 1960  | 1961   | 1962  | Percent change from 1961 |
|--------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|--------|-------|--------------------------|
| Lake and marsh censused (acres)----- | 4,976 | 4,931 | 7,110 | 2,222 | 5,897 | 6,871 | 7,884 | 8,733 | 13,403 | 9,962 | --                       |
| Streams censused (miles)-----        | 371   | 581   | 666   | 564   | 774   | 613   | 583   | 653   | 510    | 470   | --                       |
| Wood duck:                           |       |       |       |       |       |       |       |       |        |       |                          |
| Nesting effort:                      |       |       |       |       |       |       |       |       |        |       |                          |
| Per sq. mi. of lake and marsh-----   | 5.8   | 4.4   | 3.6   | 3.1   | 3.8   | 5.9   | 5.0   | 4.9   | 2.9    | 3.2   | +10.3                    |
| Per mile of stream-----              | .24   | .22   | .13   | .10   | .13   | .15   | .22   | .11   | .27    | .32   | +18.5                    |
| Broods per mile of stream-----       | .09   | .04   | .03   | .04   | .04   | .06   | .13   | .03   | .12    | .14   | +16.7                    |
| Average number of ducklings in-----  |       |       |       |       |       |       |       |       |        |       |                          |
| Class I-----                         | 4.9   | 5.8   | 7.3   | 6.3   | 7.0   | 9.0   | 7.0   | 8.0   | 6.4    | 8.8   | --                       |
| Class II-----                        | 4.4   | 7.2   | 6.2   | 5.8   | 6.0   | 6.3   | 5.0   | 7.2   | 6.4    | 7.2   | --                       |
| Class III-----                       | 4.6   | --    | --    | 7.0   | 6.1   | 7.5   | 4.0   | 3.2   | 4.3    | 6.2   | --                       |
| All classes-----                     | 4.5   | 6.5   | 6.7   | 6.4   | 6.1   | 7.6   | 5.6   | 7.1   | 5.8    | 8.1   | --                       |
| Mallard and blue-winged teal:        |       |       |       |       |       |       |       |       |        |       |                          |
| Nesting effort:                      |       |       |       |       |       |       |       |       |        |       |                          |
| Per sq. mi. of lake and marsh-----   | 4.0   | 2.7   | 2.5   | --    | 6.5   | 3.0   | 2.5   | 1.3   | 1.6    | .8    | -50                      |
| Per mile of stream-----              | .19   | .12   | .03   | --    | .07   | .04   | .05   | .02   | .04    | .12   | +200                     |

## G. RECOVERY RATES FROM PRESEASON BANDINGS

TABLE G-1.--Comparison of mallard direct recovery rates from preseason bandings in 1959, 1960, and 1961

| State - Location                 | Age when banded |      |      |               |      |      |               |      |       |               |       |        |
|----------------------------------|-----------------|------|------|---------------|------|------|---------------|------|-------|---------------|-------|--------|
|                                  | Immature        |      |      |               |      |      | Adult         |      |       |               |       |        |
|                                  | Number banded   |      |      | Recovery rate |      |      | Number banded |      |       | Recovery rate |       |        |
|                                  | 1959            | 1960 | 1961 | 1959          | 1960 | 1961 | 1959          | 1960 | 1961  | 1959          | 1960  | 1961   |
| Oregon:                          |                 |      |      |               |      |      |               |      |       |               |       |        |
| Summer Lake-----                 | 129             | 157  | 77   | 41.1          | 26.1 | 28.6 | 154           | 137  | 124   | 18.2          | 9.5   | 12.9   |
| Sauvie Island-----               | 370             | 594  | 342  | 23.8          | 25.6 | 18.7 | 222           | 207  | 150   | 19.8          | 17.9  | 10.0   |
| Malheur <sup>1</sup> -----       | --              | 302  | 293  | --            | 6.3  | 5.1  | --            | 214  | 209   | --            | 5.6   | 5.7    |
| California:                      |                 |      |      |               |      |      |               |      |       |               |       |        |
| Tule Lake <sup>1</sup> -----     | 370             | 288  | 252  | 15.9          | 13.9 | 14.7 | 1,142         | 443  | 729   | 6.7           | 7.7   | 6.6    |
| Idaho:                           |                 |      |      |               |      |      |               |      |       |               |       |        |
| Camas <sup>1</sup> -----         | --              | --   | --   | --            | --   | --   | --            | 309  | 260   | --            | 4.5   | 4.2    |
| Nevada:                          |                 |      |      |               |      |      |               |      |       |               |       |        |
| Ruby Lake <sup>1</sup> -----     | --              | --   | 144  | --            | --   | 9.0  | --            | 272  | 231   | --            | 7.7   | 7.4    |
| Montana:                         |                 |      |      |               |      |      |               |      |       |               |       |        |
| Medicine Lake <sup>1</sup> ----- | 51              | 681  | 76   | 11.8          | 5.4  | 3.9  | 276           | 371  | 195   | 6.5           | 4.8   | 3.1    |
| Ninepipe <sup>1</sup> -----      | 101             | 514  | 521  | 13.9          | 10.5 | 11.3 | 108           | 513  | 787   | 3.7           | 5.8   | 8.8    |
| North Dakota:                    |                 |      |      |               |      |      |               |      |       |               |       |        |
| Lower Souris <sup>1</sup> -----  | --              | 137  | 138  | --            | 8.0  | 8.7  | 469           | 729  | 1,312 | 4.7           | 7.1   | 5.1    |
| South Dakota:                    |                 |      |      |               |      |      |               |      |       |               |       |        |
| Sand Lake <sup>1</sup> -----     | --              | 394  | 225  | --            | 7.1  | 3.6  | --            | 617  | 976   | --            | 8.3   | 3.8    |
| Manitoba:                        |                 |      |      |               |      |      |               |      |       |               |       |        |
| Libau Marsh-----                 | 401             | 368  | 318  | 11.5          | 16.8 | 8.5  | 235           | 102  | 100   | 7.6           | 7.8   | 9.0    |
| Minnesota:                       |                 |      |      |               |      |      |               |      |       |               |       |        |
| Agassiz <sup>1</sup> -----       | 657             | 730  | 369  | 11.1          | 18.5 | 7.3  | 335           | 350  | 707   | 8.6           | 8.3   | 4.2    |
| Rice Lake <sup>1</sup> -----     | 567             | 477  | 341  | 14.5          | 13.6 | 5.0  | 392           | 225  | 13.0  | 13.0          | 10.7  | --     |
| Ontario:                         |                 |      |      |               |      |      |               |      |       |               |       |        |
| Oshawa-----                      | 152             | 125  | 242  | 15.8          | 13.6 | 10.7 | --            | --   | --    | --            | --    | --     |
| Michigan:                        |                 |      |      |               |      |      |               |      |       |               |       |        |
| Shiawassee <sup>1</sup> -----    | 347             | 665  | 505  | 12.1          | 15.3 | 8.3  | --            | 93   | 182   | --            | (7.5) | (8.2)  |
| Seney <sup>1</sup> -----         | 148             | 235  | 269  | 14.2          | 14.5 | 7.8  | --            | --   | --    | --            | --    | --     |
| New York:                        |                 |      |      |               |      |      |               |      |       |               |       |        |
| Perch Lake-----                  | 506             | 618  | 576  | 11.1          | 13.8 | 12.7 | 85            | 81   | 106   | (5.9)         | (8.6) | (11.3) |
| Howland Island-----              | --              | 326  | 392  | --            | 8.3  | 11.5 | --            | 258  | 277   | --            | 5.8   | 5.8    |

<sup>1</sup> National Wildlife Refuge.

TABLE G-2. --Comparison of black duck direct recovery rates from preseason bandings in 1959, 1960, and 1961

| State - Location              | Age when banded |      |      |               |      |      |               |      |      |               |      |      |
|-------------------------------|-----------------|------|------|---------------|------|------|---------------|------|------|---------------|------|------|
|                               | Immature        |      |      |               |      |      | Adult         |      |      |               |      |      |
|                               | Number banded   |      |      | Recovery rate |      |      | Number banded |      |      | Recovery rate |      |      |
|                               | 1959            | 1960 | 1961 | 1959          | 1960 | 1961 | 1959          | 1960 | 1961 | 1959          | 1960 | 1961 |
| Ontario:<br>Oshawa-----       | 332             | 168  | 242  | 14.2          | 12.5 | 13.6 | --            | --   | --   | --            | --   | --   |
| New York:<br>Perch Lake-----  | 626             | 524  | 335  | 9.9           | 13.6 | 14.0 | 91            | 96   | 66   | 6.6           | 11.5 | 6.1  |
| Howland Island-----           | --              | 107  | 130  | --            | 9.3  | 8.5  | --            | 155  | 128  | --            | 6.4  | 7.8  |
| Wilson Hill-----              | 374             | 282  | 413  | 11.8          | 18.1 | 9.0  | 99            | 157  | 133  | 8.1           | 15.3 | 7.5  |
| Vermont:<br>State Totals----- | 622             | 639  | 244  | 11.9          | 10.6 | 9.4  | --            | --   | --   | --            | --   | --   |
| New Brunswick:<br>McAdam----- | 394             | 357  | 129  | 8.9           | 7.8  | 7.0  | --            | --   | --   | --            | --   | --   |

TABLE G-3. --Summary of wood duck direct recovery rates from summer and preseason bandings, 1959-1961

| State                       | Year<br>banded | Number banded |          | Direct recovery rate |          |
|-----------------------------|----------------|---------------|----------|----------------------|----------|
|                             |                | Adult         | Immature | Adult                | Immature |
| Minnesota-----              | 1959           | 185           | 375      | 7.0                  | 8.3      |
|                             | 1960           | 87            | 108      | 1 (9.2)              | 9.2      |
|                             | 1961           | 225           | 483      | 1.8                  | 3.1      |
| Wisconsin-----              | 1959           | 258           | 638      | 6.2                  | 8.2      |
|                             | 1960           | 554           | 1,534    | 6.3                  | 9.8      |
|                             | 1961           | 903           | 1,042    | 3.0                  | 4.4      |
| Michigan-----               | 1959           | 183           | 185      | 9.3                  | 11.9     |
|                             | 1960           | 127           | 204      | 3.9                  | 8.8      |
|                             | 1961           | 145           | 67       | 2.8                  | (0.0)    |
| New York <sup>2</sup> ----- | 1958           | 53            | 456      | (7.5)                | 9.0      |
|                             | 1959           | 130           | 199      | 1.5                  | 5.5      |
|                             | 1960           | 160           | 496      | 4.4                  | 7.9      |
|                             | 1961           | 210           | 557      | 2.9                  | 7.2      |
| Vermont <sup>2</sup> -----  | 1958           | 73            | 274      | (15.1)               | 13.5     |
|                             | 1959           | 111           | 183      | 8.1                  | 12.2     |
|                             | 1960           | 225           | 573      | 7.6                  | 9.2      |
|                             | 1961           | 320           | 324      | 7.5                  | 7.7      |
| Indiana-----                | 1959           | 128           | 97       | 3.1                  | (2.1)    |
|                             | 1960           | 436           | 294      | 5.0                  | 7.8      |
|                             | 1961           | 306           | 441      | 0.6                  | 4.1      |
| Illinois-----               | 1959           | 71            | 266      | (8.4)                | 3.0      |
|                             | 1960           | 132           | 904      | 3.8                  | 6.6      |
|                             | 1961           | 92            | 161      | (1.1)                | 2.5      |
| Iowa-----                   | 1959           | 45            | 178      | (4.4)                | 7.3      |
|                             | 1960           | 41            | 445      | (7.3)                | 9.4      |
|                             | 1961           | 134           | 678      | 2.2                  | 5.0      |
| Missouri-----               | 1959           | 122           | 330      | 4.9                  | 6.4      |
|                             | 1960           | 195           | 187      | 4.1                  | 3.2      |
|                             | 1961           | 149           | 178      | 0.7                  | 3.9      |
| Louisiana-----              | 1959           | 22            | 316      | (4.5)                | 6.6      |
|                             | 1960           | 109           | 162      | 0.0                  | 5.6      |
|                             | 1961           | 84            | 156      | (1.2)                | 0.0      |
| South Carolina-----         | 1959           | 5             | --       | (0.0)                | --       |
|                             | 1960           | 201           | --       | 3.5                  | --       |
|                             | 1961           | 222           | 451      | 3.2                  | 2.9      |

<sup>1</sup> Rates derived from banded samples of less than 100 birds are listed in parentheses.<sup>2</sup> 1958 data included for New York and Vermont bandings.



The Department of the Interior, created in 1849, is our Nation's Department of Natural Resources, concerned with management, conservation, and development of water, wildlife, fish, mineral, forest, and park and recreational resources. It also has major responsibilities for Indian and Territorial affairs.

As America's principal conservation agency, the Department works to assure that nonrenewable resources are developed and used wisely, that park and recreational resources are conserved for the future, and that renewable resources make their full contribution to the progress, prosperity, and security of the United States, now and in the future.



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